THE POLAR TIMES

January 2008

President's Letter

The recent sinking of the tourist ship *Explorer* off the Antarctic Peninsula, while shocking, was not surprising. Although the public, and particularly the tour-going public, are insufficiently aware of the hazards and risks of 21st century Antarctica, members of the American Polar Society should be.

In December and January of 1956-57, I was a naive 24-year-old graduate student beset in 25-foot-thick Weddell Sea pack ice on *Wyandot* (AKA 92) as part of Deep Freeze II en route to build Ellsworth Station on the Filchner Ice Shelf. As I noted in my journal, quoted in *Innocents on the Ice*, "The hole in the port side deep tank of #2 hold has lengthened. It starts about four feet down and is a seven-foot-long crescent-shaped gash, which acts like a scoop while moving forward." I was not particularly concerned, because no ship had sunk in Antarctica since Shackleton's *Endurance* in 1915 (only 42 years earlier). I realize now how worried captains Francis Gambacorta, skipper of *Wyandot*, and Edwin McDonald, commander of Navy Task Group 43.7 on the Navy icebreaker *Staten Island* attempting to escort *Wyandot* safely, must have been. Fortunately our water-tight compartments were closed, because #2 hold became flooded. At the same time, on the other side of the continent, the sister ship of *Wyandot*, the *Arneb*, was close to sinking because of ice damage as well.

Antarctica is still dangerous. Nearly three decades after the *Wyandot* incident, the icebreaker, *West Wind* nearly sank because of a 50-foot-long gash caused by ice. The tourist/resupply ship *Bahia Paraiso* ran aground offshore Palmer station a couple of decades ago, and the hulk is still there and leaking oil. No lives were lost despite a panicked and disorganized evacuation of tourists and crew. The German research ship *Gottland* sank in the Ross Sea, as did the ship supporting the "Footsteps of Scott" adventure-tourist expedition. Again, no lives were lost. However, four adventure-tourists died several years ago at the South Pole jumping from a plane, and 253 tourists and crew were killed, about three decades ago, when an Air New Zealand DC-10 crashed into Mt. Erebus on Ross Island. Other adventure-tourists have died in crevasses, etc.

The *Explorer* was nearly 40 years old and not an icebreaker. When the collision with pack ice occurred, a crack opened and, as Leif Skog, former captain of *Explorer,* was quoted in the *New York Times* (NYT), any leakage of water into adjoining compartments could not be effectively sealed. The ship was designed to withstand flooding of only one compartment. How many other ships carrying the 35,000 tourists to Antarctica this season have similar weaknesses?

The Antarctic Treaty member countries, while valiantly trying to urge a ban on the landing in Antarctica of tourist ships carrying more than 500 passengers, are essentially ineffective. Probably as Jim Barnes was quoted in *NYT,* only nations like Canada, where the owner of *Explorer* is based, have the ability to enforce safety in Antarctic tourism, including adventure-tourism. Mineral resources activities are prohibited in Antarctica, so no risks are occurring in this area, and the main enforcement efforts under the Convention on Antarctic Marine Living Resources seem restricted to chasing poachers.

Each time a disaster occurs in Antarctica, whether lives are lost or not, scientific programs are curtailed to some extent. National research programs, which are not budgeted for the purpose, have the only suitable capabilities and must rush to the rescue. There is a long tradition of international emergency assistance in Antarctica, primarily dedicated to supporting research activities.

It seems ironic that the final cruise of the *Explorer* was called "The Spirit of Shackleton." It is time for serious consideration of future rescue support and regulation of tourism in Antarctica.

John Behrendt,

APS President

Secretary's Letter

Lately it seems a day does not go by that I don't hear the words "climate change" or "global warming." As many of you know, these changes occur most dramatically in the polar regions. Many of you were exposed to the science during the last IPY and, as I am sure you are aware, we are now in the throes of another similar event. I hope from this great effort we will be that much closer to understanding what is driving these unprecedented climate changes.

Many of these changes appear to be happening at a rate faster than models are predicting, and others more slowly. But either way there will undoubtedly be great hype concerning these changes. If I can offer any advice, I would suggest keeping the exaggeration in check and not letting the hype spread bad science. The last thing we need is for the general public to lose confidence in the great work scientists are doing right now. It is a time of great investigation, and while many theories on the current observations will be proven right, some will be proven wrong. That is the basis and elegance of peer-reviewed science.

So with that, enjoy the following articles in this issue of *The Polar Times*, and we will see you next time.

Kevin Bjella

Secretary

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About Our Front Cover

Thinning Arctic ice cap is the underlying theme for most of our articles in the Arctic segment of this issue. Not a pretty sight and not the most dramatic cover we have presented. Nonetheless, it is topical and not to be ignore. One of our new contributing editors , Moki Kokoris, took this photo from the cockpit of a Soviet Androv aircraft. More about Moki in pages following. ❑

American Polar Society

The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Membership dues are $15 a year ($17, foreign) and entitle members to receive ***The Polar Times*** twice a year. The American Polar Society is classified as a tax exempt organization under Sec 501(C)3 of the IRS Code. For more information about the American Polar Society, contact Kevin L. Bjella, ***APS Secretary***, at 1.802.295.6881 or send email to kevin.bjella@erdc.usace.army.mil.

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The Polar Times

January 2008, Vol. 3, No. 12

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Photo by McKenzie Funk

Arctic Melt Unnerves the Experts

***The New York Times*, 2 October 2007, by Andrew C. Revkin**—The Arctic ice cap shrank so much this summer that waves briefly lapped along two long-imagined Arctic shipping routes, the Northwest Passage over Canada and the Northern Sea Route over Russia.

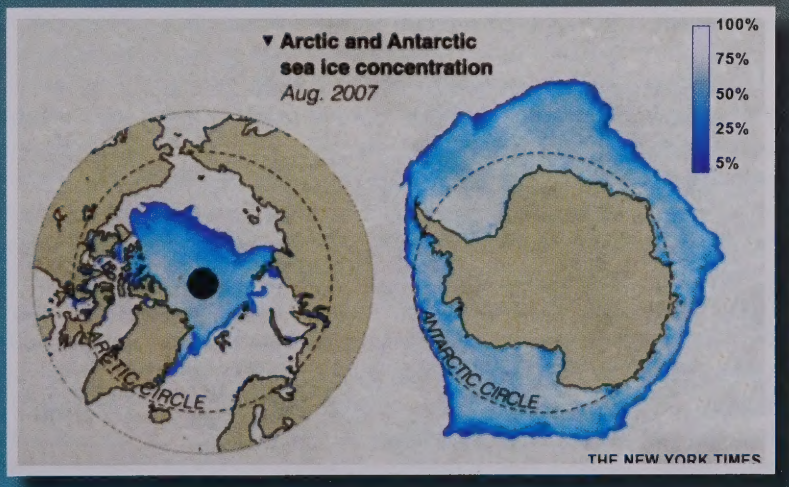
Over all, the floating ice dwindled to an extent unparalleled in a century or more, by several estimates.

Now the six-month dark season has returned to the North Pole. In the deepening chill, new ice is already spreading over vast stretches of the Arctic Ocean. Astonished by the summer's changes, scientists are studying the forces that exposed one million square miles of open water—six Californias—beyond the average since satellites started measurements in 1979.

At a recent gathering of sea-ice experts at the University of Alaska in Fairbanks, Hajo Eicken, a geophysicist, summarized it this way: "Our stock in trade seems to be going away."

Scientists are also unnerved by the summer's implications for the future, and their ability to predict it.

Complicating the picture, the striking Arctic change was as much a result of ice moving as melting, many say. A new study, led by Son Nghiem at NASA's Jet Propulsion Laboratory and appearing this week in Geophysical Research Letters, used satellites and buoys to show that winds since 2000 had pushed huge amounts of thick old ice out of the Arctic basin past Greenland. The thin floes that formed on the resulting open water melted quicker or could he shuffled together by winds and similarly expelled, the authors said.



The pace of change has far exceeded what had been estimated by almost all the simulations used to envision how the Arctic will respond to rising concentrations of greenhouse gases linked to global warming. But that disconnect can cut two ways. Are the models overly conservative? Or are they missing natural influences that can cause wide swings in ice and temperature, thereby dwarfing the slow background warming?

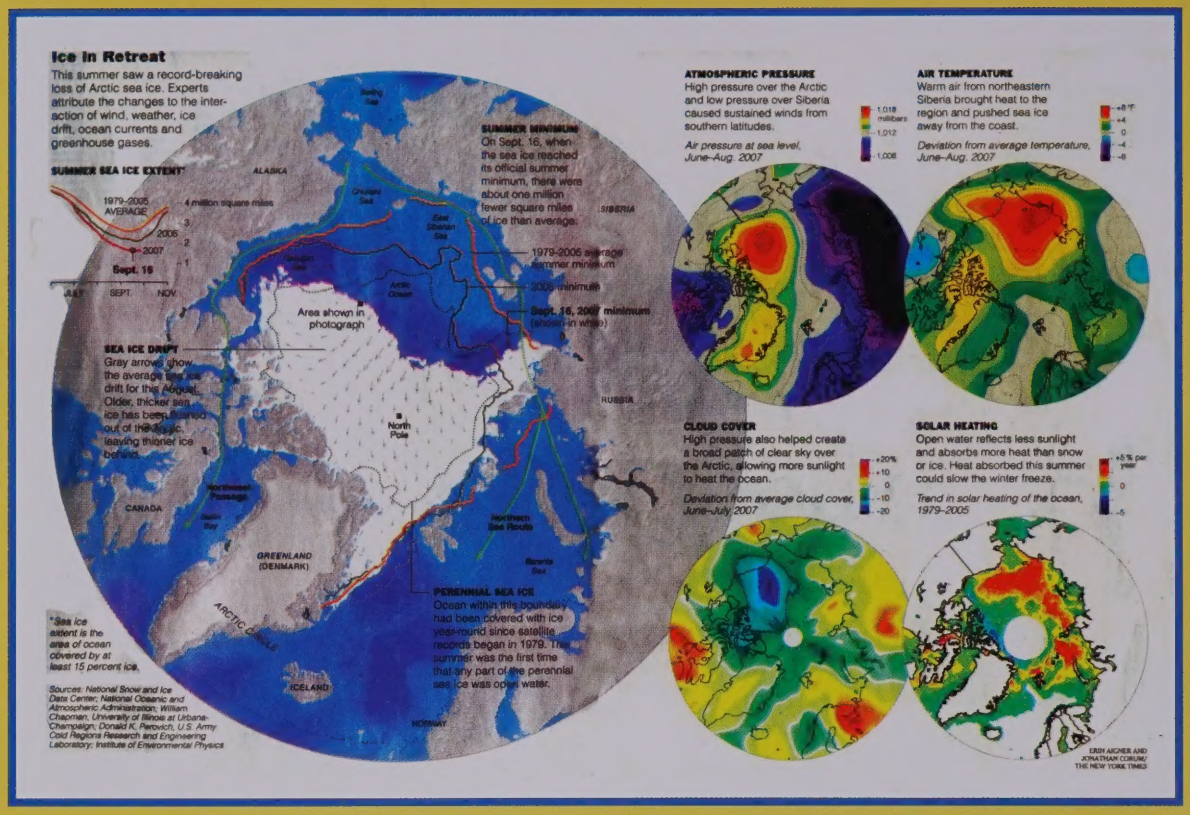
The world is paying more attention than ever.

Russia, Canada and Denmark, prompted in part by years of warming and the ice retreat this year, ratcheted up rhetoric and actions aimed at securing sea routes and seabed resources.

Proponents of cuts in greenhouse gases cited the meltdown as proof that human activities are propelling a slide toward climate calamity.

Arctic experts say things are not that simple. More than a dozen experts said in interviews that the extreme summer ice retreat had revealed at least as much about what remains unknown in the Arctic as what is clear. Still, many of those scientists said they were becoming convinced that the system is heading toward a new, more watery state, and that human-caused global warming is playing a significant role.

Continued on p. 4


Ice in Retreat
This summer saw a record-breaking loss of Arctic sea ice. Experts attribute the changes to the interaction of wind, weather, ice drift, ocean currents and greenhouse gases.
SUMMER SEA ICE EXTENT*
1979-2005 AVERAGE
4 million square miles
2005
2007
Sept. 19
JULY
SEPT.
NOV
ALASKA
SIBERIA
RUSSIA
CANADA
GREENLAND (DENMARK)
ICELAND
NORWAY
Area shown in photograph
North Pole
Northwest Passage
Northern Sea Route
SUMMER MINIMUM
On Sept. 16, when the sea ice reached its official summer minimum, there were about one million fewer square miles of ice than average.
1979-2005 average summer minimum
2005 minimum
Sept. 16, 2007 minimum (shown in white)
SEA ICE DRIFT
Gray arrows show the average sea ice drift for this August. Older, thicker sea ice has been flushed out of the Arctic, leaving thinner ice behind.
PERENNIAL SEA ICE
Ocean within this boundary had been covered with ice year-round since satellite records began in 1979. The summer was the first time that any part of the perennial sea ice was open water.
*Sea ice extent is the area of ocean covered by at least 15 percent ice.
Sources: National Snow and Ice Data Center, National Oceanic and Atmospheric Administration; William Chapman, University of Illinois at Urbana-Champaign; Donald K. Perovich, U.S. Army Cold Regions Research and Engineering Laboratory; Institute of Environmental Physics
ATMOSPHERIC PRESSURE
High pressure over the Arctic and low pressure over Siberia caused sustained winds from southern latitudes.
Air pressure at sea level, June-Aug. 2007
1,016 millibars
1,012
1,008
AIR TEMPERATURE
Warm air from northeastern Siberia brought heat to the region and pushed sea ice away from the coast.
Deviation from average temperature, June-Aug. 2007
+8 °F
+4
0
-4
-8
CLOUD COVER
High pressure also helped create a broad patch of clear sky over the Arctic, allowing more sunlight to heat the ocean.
Deviation from average cloud cover, June-July 2007
+20%
+10
0
-10
-20
SOLAR HEATING
Open water reflects less sunlight and absorbs more heat than snow or ice. Heat absorbed this summer could slow the winter freeze.
Trend in solar heating of the ocean, 1979-2005
+5 % per year
0
-5
ERIN ARCHER AND JONATHAN CORUM/THE NEW YORK TIMES

***ARTIC MELT** (CONTD)*

Wieslaw Maslowski of the Naval Postgraduate School in Monterey, Calif., projects a blue Arctic Ocean in summers by 2013.

In essence, Arctic waters may be behaving more like those around Antarctica, where a broad fringe of sea ice builds each austral winter and nearly disappears in the summer. (Reflecting the different geography and dynamics at the two poles, there has been a slight increase in sea-ice area around Antarctica in recent decades.)

While open Arctic waters could be a boon for shipping, fishing and oil exploration, an annual seesawing between ice and no ice could be a particularly harsh jolt to polar bears.

Many Arctic researchers warned that it was still far too soon to start sending container ships over the top of the world. "Natural variations could turn around and counteract the greenhouse-gas-forced change, perhaps stabilizing the ice for a bit," said Marika Holland, of the National Center for Atmospheric Research in Boulder, Colo.

But, she added, that will not last. "Eventually the natural variations would again reinforce the human-driven change, perhaps leading to even more rapid retreat," Dr. Holland said. "So I wouldn't sign any shipping contracts for the next 5 to 10 years, but maybe the next 20 to 30."

While experts debate details, many agree that the vanishing act of the sea ice this year was probably caused by superimposed forces including heat-trapping clouds and water vapor in the air, as well as the ocean-heating influence of unusually sunny skies in June and July. Other important factors were warm winds flowing from Siberia around a high-pressure system parked over the ocean. The winds not only would have melted thin ice but also pushed floes offshore where currents and winds could push them out of the Arctic Ocean.

But another factor was probably involved, one with roots going back to about 1989. At that time, a periodic flip in winds and pressure patterns over the Arctic Ocean, called the Arctic Oscillation, settled into a phase that tended to stop ice from drifting in a gyre for years, so it could thicken, and instead carried it out to the North Atlantic.

The new NASA study of expelled old ice builds on previous measurements showing that the proportion of thick, durable floes that were at least 10 years old dropped to 2 percent this spring from 80 percent in the spring of 1987, said Ignatius G. Rigor, an ice expert at the University of Washington and an author of the new NASA-led study.

Without the thick ice, which can endure months of nonstop summer sunshine, more dark open water and thin ice absorbed solar energy, adding to melting and delaying the winter freeze.

The thinner fresh-formed ice was also more vulnerable to melting from heat held near the ocean surface by clouds and water vapor. This may be where the rising influence of humans on the global climate system could be exerting the biggest regional influence, said Jennifer A. Francis of Rutgers University.

Other Arctic experts, including Dr. Maslowski in Monterey and Igor V. Polyakov at the University of Alaska, Fairbanks, also see a role in rising flows of warm water entering the Arctic Ocean through the Bering Strait between Alaska and Russia, and in deep currents running north from the Atlantic Ocean near Scandinavia.

A host of Arctic scientists say it is too soon to know if the global greenhouse effect has already tipped the system to a condition in which sea ice in summers will be routinely limited to a few clotted passageways in northern Canada.

But at the university in Fairbanks—where signs of northern warming include sinkholes from thawing permafrost around its Arctic research center—Dr. Eicken and other experts are having a hard time conceiving a situation that could reverse the trends.

"The Arctic may have another ace up her sleeve to help the ice grow back," Dr. Eicken said. "But from all we can tell right now, the means for that are quite limited." ❑

Conflicting Views on Ice Melt

***The Press*, 25 September 2007, by John Henzell**—Conflicting research about Antarctica has seen climate activists and sceptics each claiming support for their predictions for the world's biggest ice sheets.

The east and west Antarctic ice sheets contain 90 per cent of the world's fresh water and have the potential to raise sea levels by 60m if they melt.

Climate activists urging drastic action on greenhouse gases have cited a Nasa study released on Saturday showing that over the past 20 years melting has occurred in Antarctica further inland and at higher altitudes than before.

But rival climate groups urging a more cautious response to the issue have cited other research showing that for the bulk of Antarctica temperatures have grown progressively cooler and the ice sheets have increased in bulk over the past 40 years.

Glaciologist Wolfgang Rack, from Gateway Antarctica at the University of Canterbury, said the research was not necessarily contradictory but too little was known about the dynamics of Antarctica to make definitive predictions.

"I think global warming is real and this (cooling trend) doesn't mean we should go on with business as usual," Rack said.

"For some reason the climate signals cannot be seen in Antarctica."

The paucity of information about the ice sheets led the United Nations-sponsored Intergovernmental Panel on Climate Change (IPCC) to exclude the impact of Antarctica from its most recent predictions for sea-level rise.

Professor Berry Lyons, of the Byrd Polar Research Institute in the United States, said although parts of Antarctica were cooling and snow was building up rather than melting, all the models for the future were for the opposite.

"If you look at the IPCC models for the next century, it's very apparent that Antarctica is much warmer and if you believe these models and projections, there is no doubt that the terrestrial ecosystem will change dramatically," he said.

"In Antarctica we can see that loss of sea ice will lead to warming. We'll increase precipitation and increase snowfall and glaciers. There will be glacial advance and a decrease in the area of land."

The co-chair of the IPCC, Susan Solomon, said the cooling of Antarctica appeared to be because air circulation patterns over the pole had become more stable than before.

"Basically what's happened is the circulations around Antarctica have changed, so that the cold air sits bottled up over the pole more than it used to be.

"There is cooling over the Antarctic plateau and its warming in the Antarctic peninsula.

"The world has certainly warmed but we also see a few places where cooling has happened but, overwhelmingly, the ... change has been for warming almost everywhere."

A group self-described as independent and non-political, called the International Climate and Environmental Change Assessment Project (Icecap), said that while the Arctic sea ice was at its lowest levels since satellite measuring began in 1979, the Antarctic ice cap had set a new record for the amount of snow and ice. ❑

Global Warming Not To Blame For Warmer North Pole?

***The Register*, 15 November 2007, by Lucy Sherriff**—Recent dramatic changes in the Arctic climate—melting sea ice, warmer ocean, green fields in place of icy wilderness, etc—might not all be directly related to global warming.

The more clement Arctic climate of recent years could have been triggered by shorter term circulation changes in the oceans and atmosphere.

According to a team of NASA scientists, decade-long variations in ocean circulation, known as the Arctic Oscillation, have an effect on the oceans' salinity. A very salty sea is heavier and circulates differently than a less salty one, the team says. This can affect the temperature of the water in the region and thus the local climate.

The team monitored the Arctic Ocean's circulation between 2002 and 2006 using satellite data and deep sea pressure gauges. They measured the weight of columns of ocean water, and found that between 2002 and 2006, there was a 10-millibar decrease in pressure on the sea floor—equivalent to removing ten centimetres of water from the ocean.

The distribution of the decrease, and its implications for the salinity of the water, suggests that the ocean has switched to a clockwise circulation—the same as was dominant before 1990, the team writes.

In the journal *Geophysical Research Letters*, the researchers attribute the change to a weakened Arctic Oscillation. This, they explain, reduced the saltiness of the upper ocean near the pole, making it lighter and changing its circulation.

"Our study confirms many changes seen in upper Arctic Ocean circulation in the 1990s were mostly decadal in nature, rather than trends caused by global warming," said James Morison, lead researcher based at the University of Washington's Polar Science Centre Applied Physics Laboratory.

"While some 1990s climate trends, such as declines in Arctic sea ice extent, have continued, these results suggest at least for the 'wet' part of the Arctic—the Arctic Ocean—circulation reverted to conditions like those prevalent before the 1990s," he added.

Since the end of the period covered by the published data, Morison says the measurements of pressure are already swinging back to the higher levels at the beginning of the study. He offers this as evidence of just how short-lived changes in ocean currents can be.

"It is too early to say, but it looks as though the Arctic Ocean is ready to start swinging back to the counter-clockwise circulation pattern of the 1990s again," he said.

The Arctic Oscillation was fairly stable until about 1970, NASA says. From then until the late 1990's it varied considerably, before settling into a strong counter-clockwise circulation. This changed the Arctic environment considerably, and induced changes in the upper ocean that have persisted into the 21st century.

Morison adds that although the recently observed changes are more likely due to the variations in the current than directly to do with global warming, climate models do predict that a warmer world will have a stronger counter-clockwise circulation in the Arctic Ocean. This, he adds, means that the 1990s may have been a glimpse of the region's future. ❑

Water Wrestling

by Moki Kokoris

As members of the American Polar Society, none of us is indifferent to the matters currently unfolding in both the Arctic and Antarctic, and although we may be disappointed by the events themselves, we cannot deny the fact that the polar regions and their wealth are now moving ever further into the political arena. The potential for exploitation is very real.

What could very well turn into a cold war-like conflict began rather quietly, when on August 2, 2007, a manned miniature submarine named "Mir 1" planted a titanium capsule containing the Russian flag into the seabed at the North Pole. Organized by Artur Chilingarov, deputy speaker of the parliament's lower house, this was a symbolic act representing Russia's controversial claim of the vast resources believed to be stored beneath it.

For the Russians and other countries surrounding the North Pole, global warming may yet prove to be a financial blessing. Studies claim that up to a quarter of the world's undiscovered oil and gas resources lie buried beneath the rapidly thawing ice, as well as uranium, titanium and gold. United Nations experts estimate the shelf reserves at 140–180 billion metric tons of hydrocarbons. In other words, there is a lot at stake, especially now that the peak of an energy crisis, perhaps the most serious in history, is approaching.

Under the UN Convention on the Law of the Sea, countries have the right to economically exploit zones in the Arctic within 200 miles of their own respective shores. All countries have ratified this treaty—with the exception of the United States, which is now preparing to do so, with Senate approval pending.

Understandably, adding the land mass and the waters above demarcated continental shelves would markedly increase the exploitable area of resource prospects, from oil to fishing, and also give nations rights for military control over the defined regions. Such actions clearly threaten to transform the oceans into another arena for conflict and instability.

According to the Houston World Oil Conference data, approximately 70 percent of the polar region's undiscovered gas deposits are in the Russian Arctic zone. Russia will have to defend its rights to a considerable part of this territory, which is why it undertook its initial Arctic campaign without waiting for the UN commission's verdict on the limits of the continental shelf. After completing the research mission, Russia argued that the underwater Lomonosov and Mendeleyev ridges lie on a continental shelf connected to Russia's land mass. Moscow plans to file an application to claim the shelf with the United Nations next year.

It should therefore be no surprise that the Russian claim of the North Pole and the entire region extending to it has alarmed the Pole's neighboring states.

Finland's Defense Minister stated that there were three threats to his country's security: "Russia, Russia and Russia."

Unfortunately, those concerns aren't baseless. Russia has greatly expanded its naval and aerial military activities near the Norwegian border as well. Over the past five months Norway's air force had to launch fighter jets on 18 occasions to identify Russian long-range bombers that flew dangerously close to Norwegian airspace.

However, Russia and Norway aren't the only players demanding ownership of the Arctic assets.

Denmark, Canada and the United States have also entered the race, each

Averting a Cold War on Ice

***International Herald Tribune Online*, 8 August 2007, by Scott Borgerson**—Russia's flag-planting caper at the North Pole last week captured the world's attention. Harking back to the heady days of colonial imperialism and perhaps the success of Sputnik, a resurgent Russia dispatched from Murmansk a nuclear-powered icebreaker and a research vessel armed with two minisubmarines to stake a symbolic claim to the Arctic Ocean's riches.

Russia hopes that leaving its flag encased in titanium more than 13,200 feet beneath the frozen surface bolsters its 2001 claim that the Lomonosov Ridge is a geological extension of its continental shelf and thus the 460,000 square miles of resource-rich Arctic waters stretching from the North Pole to Eurasia fall under the Kremlin's jurisdiction.

"The Arctic is ours and we should manifest our presence," declared Artur Chilingarov, the celebrated polar explorer who led the expedition.

Russia isn't alone in the great Arctic race. Thawing of the Arctic ice cap has opened access to billions of tons of oil and gas, valuable minerals like gold and platinum and untapped fishing stocks, and all the countries bordering the Arctic are staking a claim. Denmark has spent more than a quarter of a billion dollars to prove that the Arctic once was attached to Greenland, its possession. Finland, Norway and Iceland also have their eyes on the Arctic. And Canada is spending $7 billion to build a fleet of armed Arctic patrol vessels.

."Canada has a choice when it comes to defending our sovereignty over the Arctic," Prime Minister Stephen Harper said. "We either use it or lose it. And make no mistake, this government intends to use it."

Will the rhetoric escalate into armed brinksmanship on the ice?

History offers reason not to worry. Fifty years ago, the South Pole was the scene of a similar showdown. Seven countries—Britain, Argentina, Chile, France, Norway, Australia and New Zealand—had made claims to territory in Antarctica. These and other countries had established dozens of "scientific" stations on the continent. In 1956, the United States launched Operation Deep Freeze II, the last of four huge naval expeditions to fly the Stars and Stripes in the Antarctic.

Ultimately though, in a spirit of cooperation rare during the Cold War, fostered by the 1957-58 International Geophysical Year, 12 countries signed onto a treaty that established a legal framework

of them sending their own research missions into the ice to prove their claims righteous.

Denmark joined hands with Sweden to send the Swedish Arctic-class icebreaker *Oden* to the area north of Greenland on an expedition named LOMROG (Lomonosov Ridge off Greenland), aiming to prove that the Lomonosov Ridge belongs to Greenland.

Canada has vowed to update its icebreaker fleet and add two new military installations in the Arctic to assert its sovereignty over the region, inferring that it has full rights over the portions of the Northwest Passage linking the Atlantic and Pacific oceans that pass through its territory, and that it can bar transit there despite the fact that the United States believes the passage must remain free to all ships.

Harper's Magazine reported in August that the U.S. had been secretly measuring the Arctic seabed since 2003, intending to apply for an expansion of its Alaskan continental shelf to include the seabed's oil and gas reserves once the Senate ratifies the sea law convention.

The U.S. Coast Guard icebreaker *Healy* led both Germany's cutter *Polarstern* and the French schooner *Tara* to the northern latitudes for scientific studies as well.

Denmark called on all competing countries to join a meeting next year to find "a common civilized manner in which to behave," but observers view the current muscle-flexing in the Arctic as a harbinger of future struggles over its resources in an era of increased globalization.

However, the British surprised everyone. Unable to lay claim to any region in the Arctic, the United Kingdom decided to assert its sovereignty over its segment of Antarctica in spite of the fact that the entire continent has been under international jurisdiction for more than four decades. On October 17, *The Guardian* wrote that Britain "is planning to claim sovereign rights over a vast area of the remote seabed off Antarctica, more than 386,000 sq miles of it" in "a quickening of the race for territory around the South Pole in the world's least explored continent." There are vast oil, gas and other mineral resources there, although their extraction "is not yet technically feasible."

> *The Russian claim of the North Pole ... has alarmed the Pole's neighboring states.*

Argentina immediately responded by reclaiming its part of the southern continent to uphold its "sovereign rights" to the oceanic areas around several islands, including the Falklands.

Expectations are that Chile, Australia, New Zealand and other countries that believe they, too, have entitlement to the potentially valuable Antarctic territory will speak up soon.

So far, these players have been acting within the framework of international law, but some of them now seem ready to rewrite it. The 1959 Antarctic treaty, to which they are signatory, froze all territorial claims, and the 1991 protocol to it prohibited the production of mineral resources in the region.

The immediate task is for all countries involved in these conflicts to prepare for the next meeting of the UN Commission on the Limits of the Continental Shelf, but ultimately, it was Russia that threw the first stone that provoked the avalanche of claims, debates and accusations. The planting of its flag under the North Pole brought with it a new importance and urgency to the debate over the treaty. It is, however, quite possible that Chilingarov's expedition may prove to have been a disservice to Russia because it encouraged powerful rivals to lay their own claims to the Arctic and beyond.

With so much money and mineral wealth at stake, there is sadly little hope that today's world leaders will show much restraint. Nevertheless, they should at least have the grace to blush a little as they begin to divide up the spoils of climate change. ❑

to govern the southernmost continent. The treaty prohibited nuclear explosions, radioactive waste disposal and military deployments on Antarctica. And it encouraged continued international cooperation in scientific research. The overlapping territorial claims were not relinquished, but "frozen."

A similar diplomatic solution could put an end to the Arctic arms race today. The 2007-08 International Polar Year, a scientific research effort comparable to the International Geophysical Year, presents an opportunity to propose a treaty. The United States, which has 1,000 miles of coastline in the Arctic, should work to convene an international conference at which all the countries bordering the Arctic could settle their sovereignty disputes in an organized and transparent way.

The so-called Arctic states—Canada, Denmark, Finland, Iceland, Norway, Sweden, Russia and the United States—already participate in an intergovernmental body, the Arctic Council, which manages the environment of the Arctic. But a comprehensive Arctic treaty could go much further. It could arrange for sustainable development of Arctic resources, do the seafloor mapping that's needed to sort out the conflicting territorial claims, develop shipping shortcuts through the northern passages, set technological standards for ships that navigate the icy waters and guard the welfare of the more than 1 million indigenous people living within the Arctic Circle.

The United States should take preliminary steps to set the complicated treaty effort in motion. First, the Senate should immediately ratify the 1982 United Nations Convention on the Law of the Sea, which would enable the United States to make its claim to the continental shelf extending northward from Alaska, and guarantee freedom of navigation for the U.S. Navy.

We should also explore making agreements with Russia, Canada, Denmark and other countries that would allow for cooperation in gathering weather data, running search and rescue missions and responding to oil spills—even before a larger treaty could be negotiated.

In order to back up claims of sovereignty in the Arctic, the United States should also establish a presence there, and that would mean reinvigorating our geriatric icebreaker fleet. Even though the U.S. Navy is as large as the next 17 navies in the world combined, the United States owns only three ships intended for polar missions. Two of them are in disrepair, and the third is not robust enough for future Arctic missions. ❑

Warming May Wipe Out Most Polar Bears, Study Says

***The New York Times*, WASHINGTON, 7 September 2007, by John M. Broder and Andrew C. Revkin**—Two-thirds of the world's polar bears will disappear by 2050, even under moderate projections for shrinking summer sea ice caused by greenhouse gases in the atmosphere, government scientists reported on Friday.

The finding is part of a yearlong review of the effects of climate and ice changes on polar bears to help determine whether they should be protected under the Endangered Species Act. Scientists estimate the current polar bear population at 22,000.

The report, which the United States Geological Survey released here, offers stark prospects for polar bears as the world grows warmer.

Biologists and climate scientists conclude in the report that under middle-of-the road projections for warming the bears will by midcentury be largely relegated to the Arctic archipelago of Canada and spots off the northern Greenland coast, where summer sea ice tends to persist even in warm summers like this one, a shrinking that could be enough to reduce the bear population by two-thirds.

> *"As the sea ice goes, so goes the polar bear."*

The bears would disappear entirely from Alaska, the study said.

said Steven Amstrup, lead biologist for the survey team.

The report was released as President Bush was in Australia meeting with Asian leaders to try to agree on a strategy to address global warming. Mr. Bush will be host to major industrial nations in Washington this month to discuss the framework for a treaty on climate change.

The United Nations plans to devote its general assembly in the fall to global warming.

A spokeswoman for the White House declined to comment on the report, saying it was part of decision making at the Interior Department, parent of the survey.

In the report, the team said, "Sea ice conditions would have to be substantially better than even the most conservative computer simulations of warming and sea ice" to avoid the anticipated drop in bear population.

In a conference call with reporters, the scientists also said the momentum to a warmer world with less Arctic sea ice—and fewer bears—would be largely unavoidable at least for decades, no matter what happened with emissions of heat-trapping gases like carbon dioxide.

"Despite any mitigation of greenhouse gases, we're going to see the same amount of energy in the system for 20, 30 or 40 years," said Mark Myers, the survey director. "We would not expect to see any significant change in polar conditions regardless of mitigation."

In other words, even in the unlikely event that all the major economies were to agree to rapid and drastic reductions in emissions of carbon dioxide and other heat-trapping gases, the floating Arctic ice cap will continue to shrink at a rapid pace for the next 50 years, wiping out much of the bears' habitat.

The report makes no recommendation on listing the bears as a threatened species or taking any action to slow ice cap damage. Such decisions are up to another Interior Department agency, the Fish and Wildlife Service, which enforces the Endangered Species Act. That decision is due in January, officials have said. The wildlife agency had to make a determination on the status of a threatened species because of a suit by environmental groups like Greenpeace and the Natural Resources Defense Council.

PHOTO BY JAN WILL

A polar bear managed to get on an ice floe floating in the Arctic sea. Due to global warming the natural environment of the polar bear in the Arctic has changed a lot. The Arctic sea has much less ice than it had some years ago.

> *The floating Arctic ice cap will continue to shrink at a rapid pace for the next 50 years, wiping out much of the bears' habitat.*

In some places, the bears have adapted to eating a wide range of food like snow geese and garbage. But the survey team said their fate was 84 percent linked to the extent of sea ice.

Separate studies of trends in Arctic sea ice by academic and government teams have solidified a picture of shrinking area in summers for decades to come.

A fresh analysis by scientists of the National Oceanic and Atmospheric Administration, to be published Saturday in the journal Geophysical Research Letters, says sea-ice coverage of the Arctic Ocean will decline by more than 40 percent before the summer of 2050, compared with the average ice extent from 1979 to 1999.

This summer the ice retreated much farther and faster than in any year since satellite tracking began in 1979, several Arctic r search groups said. ❑

Whither Polar Bears?

Just some facts—draw your own conclusions.

- Polar bear population in 1960: 5000
- Polar bear population 2006: 25,000
- A five-fold increase primarily the result of stricter hunting regulations.
- Of the twenty distinct subpopulations of polar bears, two are known to be declining, more than half are stable and two are increasing (Beaufort Sea area).
- In the two declining areas it has actually become colder over the past fifty years.
- In the two increasing areas it is getting warmer.
- Three to five hundred polar bears are shot—legally—each year.
- The World Conservation Union's Polar Bear Specialist Group predicts that the polar bear populations could drop 30 percent in the next 35 to 50 years and that polar bears may disappear entirely from most of their range within 100 years.
- Hunting polar bears is already banned in the U.S. but half of the world's polar bears live in Canada, where hunting is legal. And due to a huge loophole in the Marine Mammal Protection Act, American trophy hunters can travel to Canada , kill a polar bear and bring back polar bear trophies. ❑

Walruses' Migration Alarming Scientists

COLUMBUS DISPATCH

***Columbus Dispatch*, ANCHORAGE, 8 October 2007, by Dan Joling, AP**—Thousands of walruses have appeared on Alaska's northwestern coast in what conservationists are calling a dramatic consequence of global warming melting the Arctic sea ice.

Alaska's walruses, especially breeding females, usually are found on the Arctic ice pack in summer and fall. But the lowest summer ice cap on record put sea ice far north of the outer continental shelf, the shallow, life-rich ocean bottom in the Bering and Chukchi seas.

Walrus feed on clams, snails and other bottom dwellers. Given the choice between an ice platform over water beyond their 630-foot diving range or gathering spots on shore, thousands of walrus picked Alaska's rocky beaches.

"It looks to me like animals are shifting their distribution to find prey," said Tim Ragen, executive director of the federal Marine Mammal Commission. "The big question is whether they will be able to find sufficient prey in areas where they are looking." ❑

Auroras Shine on Stamps

First Class: Wasilla man's photo chosen for northern lights

***Daily News wire report*, WASHINGTON, 2 October 2007**—Two new 41-cent Polar Lights stamps were unveiled here Monday, featuring the aurora borealis and the aurora australis, or the northern and southern lights, meteorological phenomena that have been part of human folklore since the dawn of history.

The auroras are the subject of scientific investigation as part of the International Polar Year, a multinational research program that will focus on the Arctic and Antarctic until March 2009.

"Beyond their obvious beauty, these stamps also carry a message," said Glen Walker of the U.S. Postal Service. "Just as it is our privilege to enjoy the wonders of nature, it is also our duty to preserve and protect these wonders."

The Postal Service produced 80 million of the stamps in panes of 20, designed by Falls Church, VA-based artist Phil Jordan.

The photograph of the northern lights is the work of Fred Hirschmann of Wasilla; the photograph of the southern lights is by German photographer Per-Andre Hoffmann.

Sen. Ted Stevens was among the guests at the ceremony Monday at the Smithsonian.

The stamps can be purchased at the Postal Store at ***www.usps.com/shop***; by calling toll-free 1-800-STAMP-24; or at philatelic centers nationwide and at local post offices.

Through history, auroras have inspired a colorful folklore, especially among people in the northern regions, where the lights have been attributed to human or animal spirits and have sometimes been thought to foretell ominous news. ❑

Canada Announces Plans for Two New Bases in Its Far North

***The New York Times*, OTTAWA, 10 August 2007, by Ian Austen**—In the latest of a series of claims over portions of the Arctic, Canada said Friday that it planned to build two new military bases in the far north to assert its sovereignty over the Northwest Passage.

The status of the shipping route, navigable only with the aid of icebreakers for a small part of the year, has been the source of a longstanding dispute that has pitted Canada against the United States and Russia.

Warming climate trends may reduce ice in the passage and make it a substantially shorter alternative to the Panama Canal for commercial shipping. The seabed under the route may also contain oil, gas and minerals that could be extracted if the ice cover diminishes.

> *"The first principle of Arctic sovereignty is use it or lose it."*

Prime Minister Stephen Harper, who has been touring the Canadian Arctic for several days, said the military would convert a former mining site in Nanisivik, in the territory of Nunavut, into a deep-water port and ship refueling station. Existing government buildings in Resolute Bay, Nunavut, will be turned into an Arctic training center for the army, and the Canadian Rangers, mostly made up of Inuit volunteers, will be increased by 900 members and re-equipped.

"The first principle of Arctic sovereignty is use it or lose it," Mr. Harper said in Resolute Bay. "Today's announcements tell the world that Canada has a real, growing, long-term presence in the Arctic."

The Canadian military now has only a very small presence in the far north, relying traditionally on training exercises in the, spring and summer to assert its claim over the region. Many of those excursions involve the Rangers, who currently number about 4,100 and are equipped largely with little more than obsolete rifles.

Mr. Harper's tour and announcements took place after a Russian mission planted a tiny flag in a titanium capsule on the seabed at the North Pole last week. While the effort was billed as a claim on the territory, it was seen as mostly symbolic.

Denmark is mapping an underwater ridge that extends from Greenland as a prelude to claiming the territory. But Russia and Canada also have designs on the ridge, which may be rich in minerals.

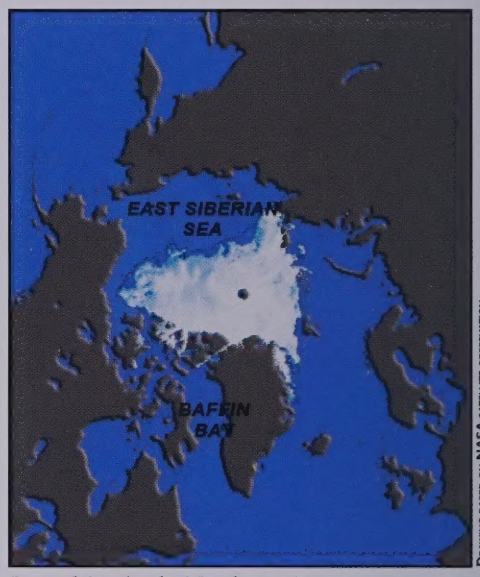
The new port will be located at the eastern entrance to the Northwest Passage, making it a point of potential contention with other nations.

Canada maintains that the passage is an inland waterway, giving it the right to control when or if any ship crosses it. Most other nations, including the United States, dispute that and argue that a right of international passage exists.

The United States and Russia have run ships through the passage without Canada's permission to assert their position. However, Canada and the United States signed a treaty in 1988 that effectively prevents American crossings except for ships also carrying Canadian scientists.

James K. Foster, a spokesman for the United States Embassy in Ottawa, said Washington was concerned only about maintaining the right of international passage through the area "The U.S. has no claims on minerals and land," he said.

In the past, environmentalists have been among those encouraging greater control of the Arctic and the Northwest Passage in particular. The region's ecosystem is particularly fragile and would be likely to suffer tremendous damage if, for example, an oil tanker sank or sprang a leak in the passage. ❑



Ice melting in the Northwest Passage

Whose Passage?

***theStar.com*, 18 November 2007, by Ed Struzik**—In the fall of 1986, foreign policy parliamentarians criss-crossing the country kept hearing Canadians speak out about Arctic sovereignty. Sen. Jerry Grafstein and others believed it wasn't just a knee-jerk reaction to U.S. icebreaker *Polar Sea*, which sailed through the Northwest Passage the year before without asking for Canadian permission.

"I had a sense," recalls Grafstein, "that with Star Wars and the growing military interest in the North ... Canadians wanted something done."

Since then, Ottawa has repeatedly asserted its sovereignty, and each time the U.S. has poured cold water on it. At the Montebello Summit this summer, President George W. Bush said the U.S. considers the Passage an international strait.

Some experts believe Canada's claim of sovereignty over the Passage has become weak now that the European Union and Russia have sided with the U.S. They also point out that the Arctic ice Canada once argued was an extension of its land is now melting. They suggest Canada should focus on the nearly 100 ships that enter its Arctic waters each year.

Michael Byers, on the other hand, believes Canada can succeed if it steps up efforts to assert northern sovereignty. "It's in (Americans') interest that we're there to make sure we stop terrorists, drug smugglers or a Liberian tanker using the Passage to get into Alaskan waters," says Byers, who holds the Canada Research Chair in Global Politics and International Law at the University of British Columbia. "If we continue do nothing, however, our chances will be lost." ❑

The IPCC: A Cliff-Notes Summary

by Moki Kokoris

As the subject of global warming appears in the news with ever increasing frequency, it should be no surprise that the 2007 Nobel Peace Prize was awarded, in two equal parts, to Al Gore Jr. and the International Panel on Climate Change (IPCC) for their collective efforts to gather and disseminate greater knowledge about anthropogenic climate change and to lay the foundations for the measures needed to counteract such change.

Most of us are aware that Al Gore has, for a long time, been one of the world's leading environmentalist politicians. He became aware at an early stage of the climatic challenges the world is facing. Even though his views are considered controversial in some circles, his strong commitment, reflected in political activity, lectures, films and books, has strengthened the struggle against climate change. He is probably the single individual who has done most to create greater worldwide understanding of the measures that need to be adopted.

The facts about the IPCC, however, are not as well known. It may help us to understand why this year's prize was shared if we familiarize ourselves with what the IPCC is and what its role has thus far been.

The IPCC is not, as some may believe, a group of scientists alone, but is a panel jointly established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP). The IPCC comprises representatives from nearly 140 governments, scientists and civil society alike with the mandate to provide decision makers and others interested in climate change with a policy-neutral and objective source of information about climate change. Its role is to assess the latest scientific, technical and socio-economic literature produced worldwide which is relevant to the understanding of the risks of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation—all to be developed in an objective, open and transparent manner.

The panel decides whether an assessment is needed and then engages and enlists scientists to conduct it. Since its establishment in 1987, there have been four such major assessments, divided among three Working Groups, which were published at roughly five year intervals, interspersed with occasional special reports on specific topics. All of these reports were expected to meet high scientific and technical standards, aiming to reflect a range of views, expertise and wide geographical coverage.

It is important to note that the collective reports are as much a summary of what is known as they are of what is not known.

The real challenge was to ensure that the assessments remained objective and not influenced by any government agendas. This was the basis for which the complex structure and process of three intergovernmental Working Groups was created, the first to assess the scientific aspects of the climate system and project the climate changes themselves, the second to assess and project the impacts and consequences of climate change for ecological systems, socio-economic sectors and human health, and the third working group to assess the scientific, technical, environmental, economic and social aspects of climate change mitigation—all of these based on peer review and internationally available literature and data.

In the last few years, the connections with man's activities have become even clearer and the consequences of climate change even more apparent.

Simplified, Working Group I developed a report titled "The Physical Science Basis," Working Group II prepared the report on "Impacts, Vulnerability, and Adaptability," and Working Group III compiled a report on "Mitigation of Climate Change." Full transcripts of each of these 1,000-page volumes are available online at **www.ipcc.ch/**. Although perhaps not always as exciting as a best-seller, each represents by far the most comprehensive and authoritative statement that we have about climate change and its potential impacts in order for us to decide how to respond to the challenges.

The last segment of the work is the Synthesis Report, namely the Fourth Assessment Report (AR4) which was released on November 17, 2007, in Valencia, Spain. The new development in the AR4 reporting process is that, from an examination of about 29,000 data sets, it concludes that the impacts of climate change occurring presently can be observed in every corner of our planet and are evident in their effects on human population, animals, plants, water and ice.

The IPCC has performed a very important task as has Al Gore. Indications of changes in the Earth's future climate must be treated with the utmost seriousness, and with the precautionary principle uppermost in our minds. Extensive climate changes may alter and threaten the living conditions of much of mankind. They may induce large-scale migration and lead to greater competition for the Earth's resources. Such changes will place particularly heavy burdens on the world's most vulnerable countries. There may be increased danger of violent conflicts and wars, within and between states if these issues are not addressed.

Through the scientific reports it has issued over the past two decades, the IPCC has created an ever-broader informed consensus about the connection between human activities and global warming. Whereas in the 1980s global warming seemed to be merely an intriguing hypothesis, the 1990s produced firmer evidence in its support. In the last few years, the connections with man's activities have become even clearer and the consequences of climate change even more apparent.

By awarding the Nobel Peace Prize for 2007 to the IPCC and Al Gore, the Norwegian Nobel Committee decisively placed sharper focus on the processes and decisions that appear to be necessary to protect the world's future climate, thereby reducing the threat to the security of mankind. Action is necessary now, before climate change moves beyond man's control. ❑

Note From the Editor

I am pleased to introduce to the membership two new contributors to the production of *The Polar Times*—Moki Kokoris and Herbert E. Drury.

Moki and Herb have agreed to become Arctic contributing editors, in part to fill the organizational void incident to Dr. Dave Norton's departure and also to extend the reach of our coverage of the Arctic affairs, which seem to be expanding exponentially as the result of global warming, sovereignty issues rooted in the unceasing demand for oil and other economic issues that are certain to arise as the summer sea ice coverage dwindles.

Our search for a new Arctic editor to succeed Dave Norton was at first not fruitful—not only because of the large imprint he made on this office but also because candidates were well aware that "too much is going on to get your arms around" in this volunteer, non-remunerative capacity. It took a while, but I finally "got it" and thus came the decision to address this part of our polar responsibilities with more than one participant, to have them share topics and areas of interest and tap more resources within their own networks for material of interest to our readers.

Ideally, I would like to enlist a third Arctic contributing editor, preferably someone from the scientific and/or academic communities who would strengthen our coverage from that vantage point. Any volunteers or recommendations for this more closely defined role? Email me at **cv1957@optonline .net**.

Both Moki and Herb have contributed to this issue, and most of you will recall Herb's article about the "Musk Ox" in our July 2007 issue.

Thumbnail CVs

Herbert R. Drury—Born way back when, in Cleveland, Ohio (the same place and a scant year before the editor of *The Polar Times)*, Herb was raised in Hanover, N.H., and graduated Dartmouth College with Highest Distinction in Geography. Continuing his education, he attained Masters degrees in Conservation (from the University of Michigan) and Botany/Zoology (from State University of South Dakota).

An avid and lifelong outdoorsman, he participated in four expeditions to Arctic Canada and Greenland, 1952-1960. For twenty years he taught biology and general science in public and private schools in New England and then spent another 20 years in Colorado in a variety of outdoor endeavors, including four seasons as a trout fishing guide and, later, two more years of same in Alaska, near Anchorage.

A competitive skier in his youth, Herb was never far from mountains and continued downhilling as a Nastar in the senior ranks.

Home is now in Big Bear City, Calif., where he is active in volunteer work, travel, hunting, fishing and writing of his experiences.

Moki Kokoris—Moki is a freelance graphic artist/designer/illustrator, as well as a teacher of graphic design, piano and polar ecology in Ridgewood, Conn. She holds a degree in Architecture from Cooper Union and is also a graduate of the Ukraine Music Institute.

Moki is the first woman of Ukraine descent to have reached the North Pole (23 April 2003). She is a lifetime member of the American Polar Society—one of our own. She is also an active member of Polar Bears International and recently launched a new outreach program named "90 North" which, among its activities, includes a collaborative exchange with the U.S. Polar Rock Repository at the Byrd Polar Research Center.

Moki's interests are concentrated on the Arctic, including its flora, fauna, peoples and the need for conservation in this important region of the world. Her Russian language skills and access to their media will provide *The Polar Times* a unique source of information heretofore only available to us through public translations.

She also provides our readers another window on the polar world by virtue of her consultative status with the Department of Public Information of the United Nations and her membership on the U.N.'s Planning Committee for the Conference on Climate Change. ❑

Due North

by Arctic Contributing Editors Herbert R. Drury and Moki Kokoris

HERB: I recall the first time I heard mention on public media of the earth environment becoming damaged by human activity. The word "ecology" soon became a household slogan, along with names of people like Rachel Carson and others, not long after I graduated from college over fifty years ago. I thought to myself, "Now maybe people everywhere will begin to think about what we are doing to our earth." It has taken that long, but the "international conservation movement," as it could be named, seems to finally be getting the world wide attention it needs. Events in the polar regions, and the Arctic in particular, are beginning to be noticed more every day, and the international connotations thereof are being heralded almost everywhere in our lives and those of people in many other nations. It is time that we start seriously thinking about how we live our lives because, if we fail to do so, the consequences now appear to be even more fearful than most of us ever imagined. At least that is how it looks to me.

There now seems to be some hope at last, however. I see and hear daily indications that people almost everywhere are starting to do little things that cumulatively may begin to influence changes for the better in how we use energy in all its forms that produce a variety of "greenhouse gases" affecting our environment, land, water, atmosphere and all living creatures therein. New movements to control and reduce emissions are afoot in many places, at least in part due to a flurry of books, essays, news reports, and political debates beginning to flood the public media. Some of these center upon the polar

bear and its associated creatures as warning beacons where changes in habitat are happening, according to numerous sources, more rapidly than anywhere else. It is only one of the many organisms in that region that are being affected by increasing oil and gas development locally. The bear is an emotional symbol that appeals to the masses, yet is only one symptom of problems developing everywhere, not just in polar regions, and that fact is finally starting to hit home for the average American household in many ways.

Examples I've noticed just this week include: Los Angeles area auto show emphasizing "buying green" with various new models touting greater gas mileage; television and newspaper ads for numerous products designed to limit our "carbon footprint;" political debates among presidential candidates on how they plan to reduce our energy consumption; new legislation in several states trying to control pollution and other negative problems; and recent books, articles, essays and published opinions coming out almost daily on the global warming issue. The catalyst for much of this renewed interest currently seems to center largely on the Arctic regions.

Russia's "Sputnik" spurred America to revitalize our science programs back when I became a teacher. I was one of many who benefited immensely, thanks to our National Science Foundation "Institutes for Secondary School Science and Mathematics Teachers," besides sponsoring much of the U.S. polar research ever since. My four trips to the Arctic regions of North America and Greenland helped give me first-hand knowledge of polar conditions during the "Cold War" era. Now Russia has done it again by planting a titanium national flag in the sea floor at the exact North Pole. Suddenly many countries are again scrambling to take second looks at this region, not only for its land, wildlife and people, but now for the very real possibility of a northwest passage. That trade route, largely imaginary until now, with ice melting at alarming rates, presents hopes of greatly reducing travel distances for shipping, and all that encompasses, both good and bad, between the Atlantic and Pacific Oceans. Collisions, oil spills, degradation of land and water by the influx of vessels and humans, are associated plagues that most of us have probably never even considered. More and more of us now are apparently doing just that, however. Early estimates of polar bear demise talked of the year 2050 as the time it might happen, but lately I've seen estimates in the hundred year range or more. To be sure, if we do not do something soon, the nearer date may become fact, but there now seem to be signs that the later date may be more likely, or perhaps not at all if we get on the problem promptly.

There are still disconcerting movements out there in the arctic landscape and elsewhere, such as expanding oil, gas and shipping industry, political territorial grabs, and special interest groups lobbying or funding adverse activities worldwide. There are, however, encouraging signs that Americans and people in more developed nations at least are beginning to think twice about how to live our lives, whom to vote into office, and what movements to support that will tend to reduce the chances of leaving a diminished environment, be it polar or otherwise, to our descendants. I worry, however, if we will succeed in making a difference in time. Right now I do not really envy the lives my grandchildren, or theirs, may have to live. I prefer to remember life in the arctic cold war days of the nineteen fifties! ❑

MOKI: Greetings, members! As the newbie here in the editorial realm, having submitted my own contributions to this issue on sobering subjects such as global warming and resource exploitation, I thought I'd also offer you a little something for the opposite side of the balance scale. As James Thurber said: "Humor is a serious thing. I like to think of it as one of our greatest earliest natural resources, which must be preserved at all cost." Hear, hear, James!

My "Kodak moment" at the geographic North Pole in April, 2003 was much more than just a childhood wish come true. It was a transformational experience so intense that it changed the course of my life. The opportunity to witness the stunning beauty of the Big Ice and grasp its tenuous fragility awoke in me a devout passion to do everything within my power to help preserve it. And so with time and a bit of visionary thinking, an inclassroom environmental educational program was born. I now travel to elementary schools to talk about the polar biospheres and their impact on the Earth's climate, adding expedition stories to the mix which my young students are always eager to hear.

Kids being kids, they never cease to amaze me, but it is their questions and comments that keep me grinning. In the letters they send me afterwards, many of which also contain material fit for a comedy routine, is where I find my motivation to continue. I try to be prepared, so to the question of whether I saw Santa, I have my routine ditty, "No, Timmy. Santa's workshop has to move to land for the summer because the ice gets too thin to support the buildings." I even show a photo of an abandoned coal mine structure on a Svalbard mountaintop which is the presumed summer home of Santa as all Scandinavian children believe. Then came the letter, "Dear Moki, Thank you for coming to talk to my class. I learned a lot, but I can't believe that Santa doesn't live at the North Pole all the time. Parents are such liars!"

And on the subject of "Don't eat yellow snow," there are the typical, "Um, when you're on the polar ice cap, where are the bathrooms?" and, "Can boys write their names in the snow or do the droplets freeze on the way down and bounce like tiny marbles?" Topping that was a comment by a little girl, "I guess you have to eats lots of prunes because you sure don't wanna be constipated when your pants are down in temperatures like that."

Now, 3rd and 4th graders are one thing, but it is the older—way older—children in the shape of adults who truly astound me. I now collect these grown-up questions, too. "Did you collect any rocks at the North Pole?" to which I wish I could respond with another question, "Were you absent that day in school when your teacher asked you to color in all of the oceans?" However, my favorite of all—and I remind you, from an adult—"Did you get altitude sickness up at the North Pole." In my stunned silence, I waited momentarily for the light to turn on. Instead came part two, "Well, you probably did because you were waaaaaaay up there at the very top." Meanwhile, the altimeter on my GPS unit as I stood at degree 90N read exactly 6.00. But perhaps that is why, in an online introduction of a presentation I was to give in Minnesota, the write-up mentioned that I was the 14th woman to summit the North Pole. Yes, summit.

It all makes me wonder. Are there that many people out there with IQs of ice cubes? Or is there a larger problem in our educational system? Setting aside the convoluted answer to *that*, I of Arctic attitude—from the very peak of the highest latitude on this planet—am doing my part in the edification of the misinformed masses to dispel the myths of the meridians, to extol the virtues of the compass and to inform one and all that there is no pole at the North Pole, really. And for the record, it is possible for boys to write their names in the snow up there, but don't try this at home. ❑

Arctic Tourism Revisited: Independent Travelers

by Dave Norton

Small selection of Denali National Park's tour buses at a rest stop on the Park Road, July 2007. (Photo by Dave and Carol Norton)

Circumboreal nation-states manage their visitor industries in pursuit of various goals. That was one of my conclusions from comparing Arctic to Antarctic tourism in three articles for *The Polar Times* January 2007 issue. Another conclusion was that Alaska's tourism is noteworthy for being managed by no nation-state, nor are its primarily non-resident corporate leaders under any other obvious adult supervision. Instead, Alaska's tour industry approaches the libertarian ideal of freedom to profit. Any constraints on plunder designed to protect sustainability within the Alaska tourism scene must come through corporate self-regulation. A wild west "cowboy" image is also apt for what Alaska's visitors experience: only half of the 1.5 million visitors to Alaska annually travel north of the 60th parallel, and fewer than 10 percent of those (i.e., about 60,000) actually make it north of the Arctic Circle (66.5° North). Thus, more visitors to Alaska absorb frontier mystiques of its far west-ness than of its far north-ness.

Revist—Reassess

Since researching and writing articles on Arctic tourism a year ago, two things have happened. First, the mass tourism that I portrayed as dominating the Alaska scene captured me. I became a "mass tourist" during a trip back and forth 90 miles through Denali National Park in July 2007. My wife and I were invited to be guests for three days in return for presenting illustrated talks on Beringia, Arctic dinosaurs and climate change to audiences of park visitors. We saw this as a chance to validate or revise the assessments I wrote last year for *The Polar Times*.

At the park entrance we boarded a tour-coach destined for the comfortably modern Kantishna Roadhouse (**www.kantishnaroadhouse.com/lodge.htm**) at the far end of the Denali Park Road. Our coach trip through the park impressed us with how tightly scheduled the pickups and disgorgements by over 100 tour buses must be to batch-process park visitors as efficiently as possible. Of the ¾ million tourists yearly reaching north of 60° in Alaska, at least 65 percent (400,000) visit Denali Park. The precision-drill spectacle played out over the narrow, winding ribbon of dusty Park Service road confirmed my apprehensions that managing high-profile visitor destinations is designed to maximize head counts. Careful attention to batch size and sweep-hands on the clock spell the difference between profit and loss amongst dozens of park concessionaires.

Our last significant exposure to Denali National Park had been 40 years earlier. As newlyweds, my wife and I worked the summer of 1967 for Camp Denali, a spectacular if exclusive destination (**www.campdenali.com**) then as now. Camp Denali is a senior neighbour located a mile or so from the newer visitor destination of the Kantishna Road House. As ancients revisiting haunts of our youth, we were concerned about changes in the Denali National Park environment under the pressure of about a 50-fold increase in visitors and worried about erosion from life's titrations of our own finite energies. Either form of change might limit our enjoyment of the trip

Tradeoffs proved interesting, however. We hiked within a smaller radius than we had 40 years ago. The classy fare of beverages and fresh food offered by the Roadhouse appealed to our palates more than we expected. Wildlife seemed less abundant within sight of the road than it had been 40 years ago. Hiking away from the road, we found the brush thicker and taller, the trails steeper than we remembered, and we were certain that the now ubiquitous Black-billed Magpies had been rare or absent in 1967. We happily focused digital cameras on smaller, less elusive Denali Park wonders: wildflowers, mushrooms, and water reflections of sky. Fortunately, tour guides and bus drivers for the Kantishna Roadhouse were keen-eyed and extraordinarily well informed about wildlife, geological formations, history and even surprisingly knowledgeable about dinosaur discoveries that my colleagues are making these days in the Park.

Another pleasant surprise was Kantishna Roadhouse guests' becoming absorbed in scientific and historical wonders illustrated by the environments they were visiting. Roadhouse staff and visiting presenters like me enjoy interacting with alert, well-informed audiences. My Powerpoint illustrations of geological and climatic wonders surrounding them stim-

ulated questions from at least a quarter of the audience. Many questioners also engaged me later in extended conversations about points I had raised, over the one or two days that their and our visits to the Roadhouse coincided.

Nevertheless, eavesdropping on guests' conversations on their way out of the park yielded some lighter moments. "Oh, Gloria, I am so glad we got to see this before Global Warming arrived." You can't expect everyone in the visitor stream to absorb a nuanced picture of how environmental changes take place.

Yipes! Skypes!

The second thing that happened in the last year started with one of my digital-age missteps. Last spring, I installed "Skype" software on my computer, designed (among other things) to enable people to confer online anywhere in the world by voice between two or more computers. Before I set up filters on Skype to protect me from "hits" by people prowling the Internet, a young man in southern Germany contacted me. He was planning to visit Fairbanks in late August, as part of a long and leisurely self-guided trip through northern parts of North America. We were soon talking regularly, he in halting English and I supplementing the words I spoke into my microphone with written text—German or English—that Robert could see pop up on his computer screen in Germany. Years ago I used to be somewhat literate, even conversant, in German. As we stumbled along in fractured mixtures of each other's languages, he enlisted my help with advice on visiting places "off the beaten track" in Alaska and Canada.

A few evenings after I returned in August from helping colleagues with dinosaur research in Arctic Alaska, Robert telephoned to say that he'd arrived in Fairbanks. Next morning, we met at the hostel where Robert was staying, had breakfast and went on to our log home to chat about options for his stay in Fairbanks. He was clearly impressed by seeing how people actually live in the North, after his exposures on the well beaten track of visitors, following his flight to Anchorage, followed by his Alaska Railroad trip to Denali Park and on north to Fairbanks. One at a time, we pieced together activities and destinations that would appeal to him in northern Alaska. For my part, I was impressed that Robert combined his independence from packaged tourism with the initiative to linger wherever he found interesting things to do for the upcoming 2 ½ months of his accumulated vacation time in North America. I was further impressed by the hostel scene, where Robert and other generally young travellers convened, most seeking low-cost adventure. Over the next 10 days parts of the diverse group staying at Billie's Backpackers Hostel peeled off together for impromptu cycling or canoeing trips, or took a bus tour to the Arctic Circle.

Robert and I went exploring rivers on several days by boat, and he helped me gillnet salmon on the Tanana River. Another day we drove into the old gold-mining district northeast of Fairbanks, hiked to an abandoned gold dredge, had coffee at a colourful roadhouse and explored the ecological changes to one river valley inflicted by wildfires and floods over the past half century. As an avid photographer, Robert was grateful for opportunities to capture digital glimpses not often seen by "packaged" tourists to Alaska. Another day, upon my recommendation, Robert visited the downtown riverfront park and exhibits commemorating Russian-American cooperation during lend-lease ferrying of warplanes through Alaska during World War II. Contrary to his expectations, he also became quite fascinated by the engineering and technical feats represented by constructing and operating a hot-oil pipeline across the depth of mainland Alaska.

Polychrome Pass, with Denali National Park road on the right winding along the face of the bluff. (Photo by Dave and Carol Norton)

The crowning adventure in Robert's stay in Fairbanks was also the most extraordinary. Upon learning that Robert's several professions in Germany included driving commercial trucks, I set about arranging for him to ride along with a teamster bound for the Prudhoe Bay oil fields and back to Fairbanks. Thanks to our recent shipments of Arctic dinosaur fossils with one local trucking company, contacts were available through which I could represent Robert's legitimate interests in professional comparisons between the conditions under which Alaska's and Germany's teamsters work. Several days after dropping Robert off at the trucking company terminal before dawn, I reconnected with him. He was still dazzled by the 14-hour drive each way over the Dalton Highway from Fairbanks to the shores of the Arctic Ocean. Despite the language barriers, Robert and his driver got on so well that they had spent Labour Day together watching parades, fireworks and barbecuing at the local community park after returning to Fairbanks.

When Robert left by bus for Whitehorse, I remained intrigued by the alternatives to mass tourism represented by Alaska's hostel scene, which can be accessed on the web at **www.alaskahostel.org/alaska_hostels.html**. A semi-resident Australian couple, Sarah and Bill, had been most helpful to Robert while he was staying at Billie's Backpakers Hostel (**www.fairbanks-alaska.com/hostels-fairbanks-alaska.htm**). These season-long caretakers at Billie's had investigated costs and made bookings for Robert, and had shared with me their observations of how low-budget travelling has evolved in Alaska over the years they have been coming here. Through them, I also met Ralph (**www.1stalaskaoutdoorschool.com**), a wilderness lodge owner and organizer of customized tours designed for independent (read: non-package tour) visitors.

A preliminary analysis of the 2007 Alaska tourism season indicated that independent visitors were more numerous than ever. So people who choose to journey around Alaska "off the beaten track" in the future can look forward to plenty of interesting company. ❑

Where are *Erebus* and *Terror*?

The Ships of Sir John Franklin's Arctic Expedition

by Charles H. Lagerbom

Introduction

During the final days of July 1845, the whaling ship *Enterprise* commanded by Captain Robert Martin came upon Arctic explorer Sir John Franklin's ships HMS *Erebus* and *Terror* tied to an ice floe in upper Baffin Bay. After a brief visit and exchange of information, Franklin's two ships sailed west into Lancaster Sound in search of the Northwest Passage and were never heard from again. Enormous resources were dedicated over the next decade (and subsequent years) to solving the mystery of Franklin's disappearance, yet only tantalizing clues emerged as to the fate of the 129 men. Fragmentary evidence included hastily scrawled messages, a scattering of relics and items from the expedition, sketchy native Inuit testimonies and inconclusive forensic material from the dying men's march to the south along the western shores of King William Island. The two largest pieces of evidence that might shed light on this mystery are still out there somewhere. They are Franklin's ships, the *Erebus* and *Terror*.

Background

After the encounter with the *Enterprise*, Franklin's ships crossed Baffin Bay and entered Lancaster Sound, circumnavigated Cornwallis Island and wintered at Beechey Island, where they buried three dead sailors. Upon their departure from Beechey Island the following summer, the ships continued westward towards Cape Walker until stopped by impenetrable ice streams which poured in from Viscount Melville Sound. This forced them to veer southwards into Peel Sound. Sailing south, with Prince of Wales Island providing protection from ice streams to the west, they passed Somerset Island. When Boothia Peninsula appeared to their east, they no longer enjoyed the protective influence of any western land. Very soon, thick floes from the west, coming down through McClintock Channel, enveloped them as they neared King William Island. The ships became beset in ice on September 12, 1846. Nineteen months later on April 22, 1848, second-in-command Francis Crozier and 104 men abandoned the ships and began a desperate march south. Human remains and scattered remnants and relics from the expedition would provide tantalizing clues as to what might have happened.

Within three years of their disappearance, numerous searches and rescue expeditions had been sent out in search of Franklin. While most did not solve the Franklin mystery, they nevertheless opened up large areas of otherwise unexplored regions of the northern Canadian archipelago. Franklin's fate was finally solved when a hastily scrawled note was found in a cairn at Victory Point on northern King William Island by Captain Francis McClintock in 1859. Dated May 1847, it stated the ships had become beset in ice but that all was well. A further note scribbled along the edges was added April 25, 1848 and reported that the still beset ships had been abandoned, Sir John Franklin had died the previous June, and Crozier had taken command and prepared to march the remaining survivors to Backs Fish River.

Second-in-Command Francis Crozier

The fates of Franklin and his men are one aspect of this story, but the location of the two ships has also never been found. What happened to the *Erebus* and *Terror*? The last concrete reference to them was the Victory Point cairn message which noted their abandonment on April 22, 1848. Contemporary native Inuit testimony, shoreline searches for ship artifacts and modern archaeological survey methods have helped narrow down the search for their locations.

The Ships

The *Erebus* and *Terror*, 19th century bomb ships, were used in bombardment of coastal fortifications and utilized large-bore 13- and 10-inch mortars. These weapsons, weighing three tons each, rested on strongly built wooden beds amidships and fired shells with 200 pounds of explosives. Both ships also carried two 6-pounders and eight 24-pounders for armament, and each had a complement of 67 men. Reinforced for mortar usage, the ships were considered state-of-the-art and ideal for ice work, having solid English oak ribs and beams up to 1-1/2 foot square. *Erebus*, at 372 tons and 105 feet in length with a 29-foot beam, was a purpose-built Hecla-class bomb ship; *Terror* was Vesuvius-class, at 325 tons and 102 feet long with a 27-foot beam. Both had shallow drafts of 11 feet and had been designed by Sir Henry Peake, with the *Terror* built in 1813 in Topsham and the *Erebus* built in 1826 at Pembroke dockyards in Wales.

The *Terror* had seen service at Ft. McHenry during the War of 1812 and had served in the Crimea but then had been laid up for over 15 years after being damaged near Lisbon. Recalled into service, *Terror* was used in George Back's 1836 Arctic expedition, in which the ship became trapped in ice for ten months, at one point being raised completely out of the water forty feet up the side of a cliff. Severely damaged and taking on water, *Terror* was eventually freed and managed to recross the Atlantic where Back beached it on the Irish coast to keep it from sinking. Both ships went through major refittings before they took part in Sir James Clark Ross' 1839-1843 Antarctic expedition. They returned from that arduous voyage and were soon designated for Franklin's expedition. As far as their condition was concerned, naval authorities felt that any necessary alterations were more improvements rather than repairs or reconstruction.

For Franklin's expedition, the ships' wooden hulls of three-inch English oak were overlaid with two layers of African oak (each 1.5 inches thick) wrought diagonally against one another. Two layers of two-inch-thick Canadian elm were then added, giving the hull five layers of timber almost a foot thick. The bows, thickened inside with extra timbers, were plated with inch-thick rolled and tempered sheet iron that extended along the hull for 20 feet. The keel was sheathed in extra-thick copper plate. The decks were doubled with three inches of Canadian fir, and two layers of 1.5-inch-thick African oak were added to the bottoms, for seven layers of oak over a foot in thickness. Wooden knees were replaced with massive cast iron ones to hold the ships' beams in place, and channels extended two feet from topsides

to keep ice from climbing the sides. In addition to cork insulation, an internal central heating system was installed with 11.8-inch diameter iron pipes throughout the lower deck fed by tubular boilers. Finally, condensers were attached to galley stoves for sea water conversion.

The ships were fitted with the latest in propulsion. The *Erebus* received a 15-ton, 25-hp steam locomotive engine and a seven-foot diameter two-bladed propeller, while the *Terror* got a smaller 12-ton, 20-hp locomotive engine. Both were mounted in the after-holds of each ship below the waterline. Extendable exhaust funnels allowed for dangerous smoke and cinders to blow clear of spars, sails and rigging. The screws, mounted on a 32-foot shaft to the driving wheel of the steam engine, was designed to be retracted and hauled up into an iron well on the orlop deck. In the event of ice, rudders could be detached and pintels easily removed from gudgeons. The engines provided a top speed of four knots but, with the addition of coal bunkers, 90 tons of coal and extra timber and iron plates, the *Erebus* and *Terror* rode very low in the water with a 17-foot draught and were ponderously slow.

Locating the Ships

Due to the huge amount of iron and other metals on board, magnetometer surveys might be successful in helping locate these ships. *Erebus* and *Terror* had large and numerous metal items on board, the most obvious being the two large locomotive engines. In addition, there were also ships' armaments, sheets of iron plating on the bow which extended 20 feet back, tubular boilers for propulsion, the maze of 11.8-inch steam piping throughout the lower decks, cast iron knees that held deck beams in place, condensers for seawater conversion, extendable exhaust funnels, assorted pintels and gudgeons for the rudder, the 32-foot long propeller shaft and the iron well for it on the orlop deck. Even if the ships had been crushed by ice or broken apart and scattered, it is probable that any or all of these items would produce anomaly readings during magnetometer surveys.

Side-scan sonar might also aid searchers in locating the ships on the seabed. With extra layers of oak atop the existing hull, decks and bottom, the vessels may have remained in a remarkable state of preservation and integrity in the frigid polar waters. This was demonstrated in 1980 with the finding of the merchant ship *Breadalbane*, a three-masted British barque crushed by polar pack ice off Beechey Island during the Franklin searches in 1853. So good was preservation that its hull was intact, its two masts still standing, and the *Breadalbane's* deck planks were smooth, straight and in perfect condition with the grain of wood clearly visible. This type of preservation, coupled with Inuit testimony that at least one of the abandoned ships sank before it could be fully scavenged, raises the possibility of a largely intact yet submerged vessel. This indeed might be the case if ice had not crushed it before it sank (as happened to Sir Ernest Shackleton's *Endurance* in the Antarctic).

At least five factors make finding the ships' locations difficult. One includes the fact that the abandoned ships had probably continued to drift with the ice which might have taken them many miles from their location at the time of abandonment. Another factor is the ice itself, which might have crushed the ships as it held them, thus scattering pieces along its drift. A third factor is the possibility that the ships went down in the Victoria Channel off the west coast of King William Island. If so, then years of thick ice may have scoured any signs of wreckage from the bottom. A fourth factor is the intriguing possibility that they were remanned by Franklin survivors and freed from the ice, only to become beset again at a later date and a different location. The final factor involves local Inuit, the ships' last

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Arctic Notes

Will Steger Receives Two International Awards For Climate Change

Will Steger honored by The Explorer's Club and National Geographic Adventure Magazine for his exploration of climate change

***Will Steger Foundation*, November 2007**—On October 18, 2007, Steger was honored at the Explorer's Club 2007 Lowell Thomas Awards Dinner for his journeys to the North Pole, Antarctica and his recent Global Warming 101 Expedition to Baffin Island. He is joined by a handful of other legends receiving awards for their work in "Exploring Climate Change," whose accolades include: oceanography, geochemistry, glaciology, paleoclimatology, filmmaking and atmospheric science.

On November 15, 2007, Steger received the Second Annual Lifetime Achievement Award, presented as part of *National Geographic Adventure* magazine's celebration of the year's greatest accomplishments in the world of adventure.

"I am deeply honored by these awards but I know we're not done yet. I will remain steadfast in my commitment to combat global warming through the educational programming and policy work of the Will Steger Foundation," Steger noted.

Engineers Begin Critical "Cooling Down" of Arctic Seed Vault

***Global Crop Diversity Trust press release*, 16 November 2007, LONGYEARBYEN, NORWAY**—Refrigeration units began pumping chilly air deep into an Arctic mountain cavern today, launching the innovative and critical "cooling down" phase of the Svalbard Global Seed Vault in advance of its official opening on February 26, 2008. With its capacity to hold up to 4.5 million seed samples, the vault will eventually house virtually every variety of almost every important food crop in the world. The vast collection is intended as a hedge against disaster so that food production can be restarted anywhere on the planet should it be threatened by a regional or global catastrophe. Thus, it is critical that the vault have the technical capability to keep seeds cool and viable for a long period of time.

Geoscientist Receives Grant To Study Effects Of Volcanoes On Climate Change In Arctic

***Terra Daily*, October 16, 2007**—Raymond S. Bradley, director of the Climate System Research Center at the University of Massachusetts Amherst, has received a three-year, $416,550 award from the National Science Foundation for his project, titled "Volcanoes in the Arctic System: Geochronology and Climate Impacts." The award will help Bradley and his colleagues to better understand the impacts that natural factors, such as explosive volcanic eruptions, can have on the Arctic system and on global climate fluctuations.

Polar Gateways 2008 Conference Announced

***University of the Arctic International Secretariat*, November 20, 2007**—The conference "Polar Gateways of Understanding to Solar System Exploration for IPY-IHY" will be held on 23-29 January 2008, at the Barrow Arctic Science Consortium (BASC) in Barrow, Alaska.

The Polar Gateways conference will connect electronically to arctic sites in Canada, Greenland, and Fennoscandia. The core of the meeting program will be a series of science highlight presentations from the connected arctic sites and following in progression from polar and IPY-IGY history to the present changing polar environments to future exploration and eventual habitation of analogous environments in the solar system. About fifty scientists are expected to attend.

Conference program segments:

1) History of Barrow, Polar Exploration, and IPY
2) Present and Changing Polar Environments, IGY to IPY-IHY
3) Science team meetings, field ice expeditions, and Barrow regional outreach activities
4) Polar Gateways to the Solar System

For more info, please visit www.ipy-id63.org.

NOAA's Arctic Report Card

Tracking Recent Environmental Changes

Collectively, the observations indicate that the overall warming of the Arctic system continued in 2007. There are some elements that are stabilizing or returning to climatological norms. These mixed tendencies illustrate the sensitivity and complexity of the Arctic System. They are summarized as follows: ATMOSPHERE—hot spot shifts toward Europe; SEA ICE—summer extent at record minimum; BIOLOGY—1) increasing tundra shrub cover and variable treelin advance, 2) up to 80% declines in some caribou herds, while goose populations double; OCEAN—North Pole temperatures at depth returning to 1990s values; GREENLAND—recent warm temperatures associated with net ice loss; LAND—increase in permafrost temperatures is slowing down. Details at www.arctic.noaa.gov/reportcard. ❑

eyewitnesses. While testimonies have provided tantalizing clues, nothing definitive has been learned.

Inuit Clues

Inuit testimony was collected during at least three contemporary Franklin searches. In 1859, Captain McClintock was told a vessel had been driven onto the western shore of "Ootloolik" which he thought meant the western shore of King William Island. This was later found to refer to the more southerly Adelaide Peninsula. In 1869, Charles Francis Hall learned from local Inuit that the site was very near O'Reilley Island (approximately seven miles northwest of modern Grant Point near Kirkwall Island) and that just the tops of the masts had stuck out of the water. Both of these Inuit interviews involved secondhand information that had been passed along. However, in 1879 Lt. Frederick Schwatka and Heinrich Klutschak interviewed an Inuit named Puhtoorak who stated that he had personally gone aboard one of the ships, that it had sunk during ice break up the following summer and that natives had looted it during the interim.

By studying Inuit testimony, *Erebus* and *Terror* searcher David C. Woodman has reconstructed a scenario that in turn might narrow down a search area for at least one of Franklin's ships. He argues that after *Erebus* and *Terror* had become beset in ice and Crozier led survivors southwards, the ships had been remanned after that abortive attempt. One vessel was eventually tossed by ice and sunk near Cape Crozier while natives watched. The remaining ship was eventually freed and tried to sail south by remaining survivors but was caught in ice again near Kirkwall Island near Adelaide Peninsula (known by Inuit as Utjulik). There it was finally abandoned and looted by Inuit, who broke into the interior by removing planks at ice level. This caused the ship to sink the following summer when the ice broke up and before much of the looted artifacts had been retrieved.

Woodman states that if the ship had indeed arrived at Utjulik off Adelaide Peninsula, it had done so under its own power and not just aimlessly adrift due to the gauntlet of islands (such as the Royal Geographical Society Islands), shallows and reefs which lay directly in the drift path. It would have had to maneuver around islands to arrive at the place where Inuit stated the ship had sunk. This, coupled with Hall's Inuit testimony regarding mast tops sticking out of water, argues for a location with a depth of about 125 feet. Hydrographic charts shows average depth off Utjulik coast to be 90-180 feet with deeper water west of O'Reilly Island. Since more suitable depths were encountered near Kirkwall Island, Woodman considers it to be his primary search area (about 300 square kilometers) and O'Reilly Island his secondary search area (about 200 square kilometers). These two sites, one near O'Reilly Island and the other to the north at Grant Point on Kirkwall Island, are about seven miles distant and have become Woodman's area of concentration.

Searches

Searches for the Franklin ships began soon after their disappearance and have continued to today. Intensive searches with modern survey equipment in Woodman's targeted areas began in 1965 by Dr. E.F. Roots of the Canadian Department of Mines and Technical Surveys. He used a sledge-drawn magnetometer on long traverses of 300m intervals coupled with a comprehensive set of traverses at 100m spacing over more promising areas. The anomalies he did come across were thought to be geologic in nature. Two years later, the Canadian government's Project Franklin was launched with 52 servicemen participating in a land, air and sea survey of the targeted area. Divers were even dispatched onto promising targets but no ship remains were found.

Project Ootjoolik, started in 1992, was an airborne magnetic survey of the Grant Point-Kirkwall Island area. It identified five best priority targets, three of which were checked out in 1993 using side-scan sonar without result. Sea-borne surveys conducted in 1997 using magnetometer and side-scan sonar (and in 2000 with forward-looking sonar) covered about 80 square kilometers of search area. In addition to sea surveys, shoreline searches in 1997 turned up several copper sheets which appeared to be ship cladding. They were salvaged by Inuit for making ulus, curved blades for cutting meat. Robert Grenier, chief of underwater archaeology with Parks Canada and president of the International Scientific Committee on Underwater Cultural Heritage, stated that the lack of deterioration indicated that the sheets were removed before the ship sank, when it was in the ice or grounded on shore. They also found three nails on one crumpled sheet of copper, which could be dated to the first half of the 19th century. The copper sheeting may also show evidence of have been crumpled by ice.

At such a slow pace and with much of the search area still to be covered, searchers returned to only using magnetometer surveys. The 2001 Utjulik expedition conducted a sled-pulled magnetometer survey at a line spacing of 200m where it confirmed earlier targets as geologic in nature but also identified seven high-priority sites worthy of a closer high-resolution look. These were investigated in 2002 by enclosing targets in a "box" defined by having one snowmobile drive a pattern of lines 1 km long and 50m apart centered on the target. GPS was used to confirm position with handheld receivers operating in non-differential mode. To confirm area coverage, track points were recorded from each GPS at 5 second intervals. The track spacing was done by a person pacing out distances and then used as an aiming point for the navigating snowmobile. Following this set up, the second snowmobile towed the sled with the gradiometer operator following in the navigator's tracks. The lines were run along troughs in the sastrugi along a roughly north-south orientation to minimize shaking of sleds and equipment. A computerized review of gradiometer data showed abnormalities and damage due to vibration and/or freezing temperatures so some of the survey had to be redone. Searchers then concentrated on the secondary area around O'Reilly Island, with three survey teams utilized. Survey lines were run in four "boxes" for over a week. Some missed high-priority targets from earlier seasons were resurveyed. While no ships were found, 151 square kilometers of previously unsurveyed area was searched and seven high-priority targets identified in 2001 were surveyed at 50m spacing. The most promising target from 2001 remained the best target after the 2002 survey and six magnetic anomalies considered high priority were found around O'Reilly Island. In addition to ice surveys, shoreline searches were conducted which produced a glass prism maybe from an optical instrument.

Field work conditions were dependent on weather with some storms preventing survey or shoreline searches. Temperatures ranged from -5° to -40°C with variable winds up to 35 knots. Crews dealt with whiteout conditions and occasional snowfall accumulations up to three feet. Teams assembled at Hay River, NWT, and were flown

to Gjoa Haven on southeast side of King William Island. Led by Inuit guides, parties then took two days to reach search areas on the west side of Adelaide Peninsula. Ice conditions were generally favorable with surface ice forms six to seven feet in depth, which negated fear of ice scour disturbance of any wrecks. This was due to the area being protected from heavy ice floes from Victoria Strait by the Queen Maud Gulf shoals.

Woodman's searches have been limited by money and equipment issues. His 2002 search included John Murray, an Irish documentary filmmaker. He secured numerous volunteers and private funding such as financial backer, Kevin Cronin, who went along as a helping hand and Amie Gibbons, a clapper loader from Vancouver. The Royal Canadian Geographical Society has supported his searches, as well as Ranger personnel from Canadian armed forces. Eco-Nova Multimedia Corporation assembled a competent search team and Canada's Department of Defense contributed expertise and equipment. Candian Coast Guard cutters have also assisted and Woodman has "piggy-backed" onto other expeditions into the area such as James Delgado's recreation of the voyage of the *St. Roch* through the Northwest Passage. Contributed search equipment has included differential positioning systems, sidescan sonars and magnetometers such as the Konigsberg/Simrad SM2000 forward-looking sonar and the Scintrex Smartmag 4 portable cesium magnetometer. A Knudson 320A through-ice echo sounder was also provided. Logistical and financial assistance was also secured from insitutions such as the Vancouver Maritime Museum, the Canadian Hydrographic Service and private companies like Scintrex Ltd and Harvest Foodworks. Woodman returned to his search area in 2004 with the Irish-Canadian Franklin Search Expedition. They continued pursuing leads from earlier searches and focused on the Adelaide Peninsula region. They used multi-imaging sonar that was dropped below the ice and focused on targets from earlier surveys. No ship remains or cultural material have yet been found.

Man the lifeboats!

Legalities

As searches intensified in the past fifteen years, the law started to get involved. In 1992, Historic Sites and Monuments Board of Canada declared *Erebus* and *Terror* of national historic significance, even though neither ship had been found. Parks Canada and Great Britain also signed a Memorandum of Understanding on August 8, 1997, which gave Canada the role of representing the ships' owner (Great Britain) and granted Canadian ownership of all retrieved artifacts. James Delgado, maritime archaeologist and executive director of Vancouver's Maritime Museum, stated that Franklin's ships were "among the top-10 finds in the annals of shipwreck exploration."

Since then, a profusion of searchers have expressed interest in finding the ships. The *Ottawa Citizen* reported that Robert Ballard of *Titanic* fame was involved in one such venture. The result, as stated by Robert Grenier, is that such a race to find these ships may actually endanger them "because the ability to discover, excavate and exploit sunken ships is outpacing the development of rules to preserve them intact and protect their scientific value." While the 2003 and 2004 Woodman surveys produced no dramatic discoveries, it may just be a matter of time. Or it is distinctly possible that the arctic may never give up this particular secret.

Conclusions

Finding a ship in the arctic that had been beset, abandoned, adrift, scavenged, possibly crushed in ice, possibly remanned and eventually sunk in a large area has no doubt been quite challenging. Relying solely on scanty historic records only gets one so far. Inuit testimony has also been fraught with inconsistencies and ambiguities due to translation and ethnographic issues. Relying solely on technology has also been impractical due to the large area of potential ship locations to be searched and the ravages of low temperatures, harsh weather and rough ice conditions on equipment, personnel and data. The remote locations are a logistics challenge, and the time on site actually conducting surveys has tended to be discouragingly brief. However, the search for the *Erebus* and *Terror* may be aided by environmental changes in the Arctic, as climate experts estimate that within fifty years the Northwest Passage may possibly be even more ice-free during the summer months. This will no doubt help searchers and, ironically, become what Sir John Franklin and his expedition had hoped to find in the first place: a clear water route across the top of the North American continent. ❑

The Erebus

Elevated Station Dedicati

Story by Jeff Rubin

The new elevated Amundsen-Scott South Pole Station will be officially dedicated on 12 January 2008.

Forty distinguished visitors (DVs) will attend a four-hour on-site ceremony, with representatives from the Congress, Department of State, Department of Defense, Department of Interior, Department of Homeland Security, National Oceanographic and Atmospheric Administration, Raytheon Polar Services Company, National Science Foundation Directors (current and former), NSF-Office of Polar Programs, NSF-Office of Legislative and Public Affairs, the National Science Board, the US Embassy-New Zealand and the station design team.

Formal invitations were sent out under the signature of NSF Director Dr. Adren L. Bement Jr.

The DVs arrive in Christchurch, New Zealand on 11 January 2008 for outfitting with ECW (extreme cold weather) gear and then fly to McMurdo via C-17.

They will spend the night at McMurdo and fly to South Pole via LC-130, arriving around 11:00 a.m.

Once at Pole, the guests will attend a 30-minute welcome briefing in the station gym. Next, the group will be divided into four groups of 10 each for a two-hour tour of the station and science facilities—including, of course, the store and post office—with NSF and Raytheon managers serving as tour guides.

After getting rigged up in their ECW gear, the DVs will also visit science facilities including those in the Dark Sector and at the Atmospheric Research Observatory.

They will also visit the old Dome in what will be one of the last DV tours that storied structure hosts before its removal.

A short outdoor inauguration ceremony will take place at Elevated Station's main entrance, located next to the skiway and nicknamed "Destination Alpha."

Any dignitaries making speeches outdoors will presumably be kept from getting too "windy" by the cold—average temperature for 12 January at Pole is -26.6°C or -15.9°F.

A ribbon will be cut, and the U.S. flag will be relocated from atop the Dome and placed at Destination Alpha.

The Ceremonial Pole—a red-and-white striped "barber pole" topped by a chromium globe and surrounded by the flags of the 12 countries that originally signed the Antarctic Treaty—will also be re-positioned 30m in front of the Elevated Station's walkway connecting pods A and B. In preparation for the ceremony, a circular USAP logo 3.3-m high will be attached to the walkway's exterior in December.

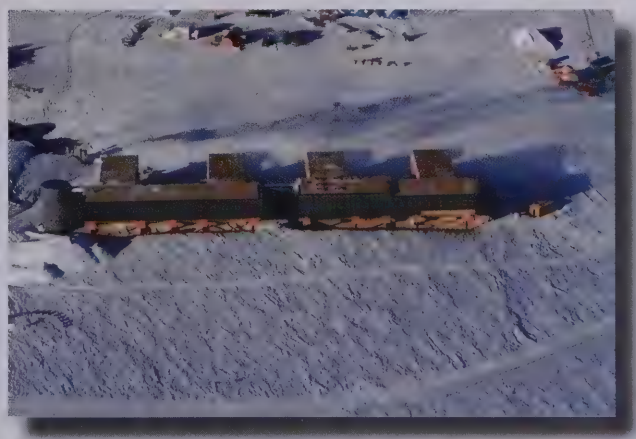
Each DV will receive, as souvenirs, a commemorative coin and patch. Limited numbers of each will also be sold at the station store.

The guests will depart from Pole at 3 p.m. and arrive at McMurdo's Pegasus ice runway around 6 p.m. A barbeque is planned at Pegasus, followed by departure to Christchurch that afternoon via C-17.

n Set For 12 January 2008

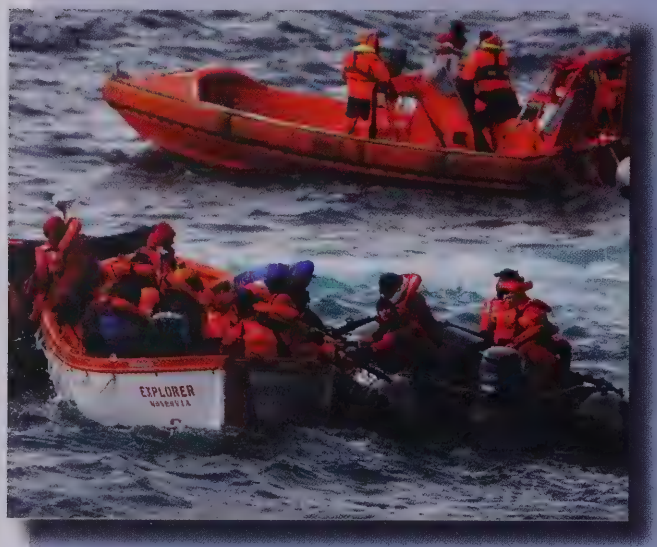
Photos courtesy of the Office of Polar Programs, National Science Foundation

Despite the official inauguration of the Elevated Station, more work remains to be done before the station is finished in 2010: completing the exterior siding; correcting heat loss; demolishing the Dome and Skylab; and completing the reconstruction of the subsurface arches into a new Logistics Facility which will include warehouses, food and other "Do Not Freeze" storage and waste management facilities. ❑



The Last Hours of a Beloved Antarctic Cruise Ship

The Liberian-flagged *Explorer* cruise ship is seen sinking after it hit an object in Antarctic waters (at 62° 24′ S., 57°16′ W.) on Friday, Nov. 23, 2007, some 880 kilometers southeast of Ushuaia, the southernmost Argentine city. More than 150 passengers and crew took to lifeboats after the ship began taking on water through a hole in the hull, naval and coast guard officials said. Thankfully, no injuries were reported. ❑



Icy Rescue as Seas Claim a Cruise Ship

***New York Times*, 24 November 2007, by Graham Bowley and Andrew C. Revkin**—They were modern adventure travelers, following the doomed route of Sir Ernest Shackleton to the frozen ends of the earth. They paid $7,000 to $16,000 to cruise on a ship that had proudly plowed the Antarctic for 40 years.

But sometime early yesterday, the *Explorer*, fondly known in the maritime world as "the little red ship," quietly struck ice.

There were the alarms, then the captain's voice on the public address system calling the 100 passengers and the crew of about 50 to the lecture hall, according to passengers' accounts on the radio and others relayed from rescuers and the tour operator.

In the lecture hall, they were told that water was creeping in through a fist-size hole punched into the ship's starboard. As it flooded the grinding engine room, the power failed. The ship ceased responding.

"We all got a little nervous when the ship began to list sharply, and the lifeboats still hadn't been lowered," John Cartwright, a Canadian, told CBC radio.

About 1:30 a.m., the passengers climbed down ladders on the ship's side into open lifeboats and inflatable craft. They bobbed for some four hours in the rough seas and biting winds as the sun rose and the day broadened, sandwiched between the 20-degree air and the nearly freezing waters, huddled under thin foil blankets, marking time. Their ship traced loose circles in the steely ocean.

And then a research ship and a Norwegian cruise liner that had heard the distress call approached.

"There was a long line of black rubber Zodiac boats and a handful of orange lifeboats strung out, and it was very surreal because it was a very beautiful morning with the sun glistening off the relatively calm sea," said Jon Bowermaster, a travel writer and filmmaker who was aboard the ship, the *National Geographic Endeavour*, and was reached by satellite phone. "And all you could think was how relieved these people must have been when they saw these two big ships coming."

A section of the *Endeavour* was dedicated to medical emergencies. But none were reported, and the Norwegian liner, the *Nordnorge*, ended up taking all the *Explorer*'s evacuees.

It was not immediately possible yesterday to reach the passengers, among them 14 Americans, 24 Britons, 12 Canadians and a smattering of other nationalities. But they were in good spirits, said Capt. Arnvid Hansen of the *Nordnorge*, who was reached by telephone about 10 hours after the rescue.

The weather had turned worse, he said, but despite snow and wind, the passengers had begun to leave the ship for the solid ground of King George Island. "They are healthy, no problem," he said. The authorities said they would head to Chile on Saturday, weather permitting, and from there return home.

And so the 154 people who survived a modern have fallen into that strange category of luck—the kind that would not be necessary had not horrendous bad fortune preceded it.

The accident occurred well north of the Antarctic Circle in an island chain that is part of the Antarctic peninsula, which juts close to South America and where a sharp warming of temperatures has occurred in recent years. It is prime territory for a new travel industry catering to an often young clientele enthusiastic about the wild in an age of environmental uncertainty.

> *"There was a long line of black rubber Zodiac boats and a handful of orange lifeboats strung out, and it was very surreal ....*

The tour operator, G.A.P. Adventures, is based in Toronto, and offers cruises to the Antarctic, Greenland, Scotland and the Amazon. It normally sends a dozen cruises a year into the Antarctic, all on the *Explorer*.

On the "Spirit of Shackleton" tour, the passengers stopped at the Falkland Islands and South Georgia Island before heading for the tip of Antarctica. Scientists on board give lectures on wildlife, geology and climate change. Their stops were to include the grave where Shackleton was buried after his fatal heart attack in 1922.

G.A.P. said it had never had an accident with one of its ships before. But in March, two Canadian women and an Australian man died after a safari van chartered by the company collided with a truck in Kenya.

The Antarctic adventure niche has its own trade group, the International Association of Antarctica Tour Operators. Its members make up a growing chunk of the $21 billion cruise industry. But regulatory authority over its members can be as confusing as in the rest of the cruise world, with a network of nations, flags and maritime rules colliding.

The *Explorer* is registered in Liberia. Built in Finland in 1969, it was designed to operate in Antarctic and Arctic waters, according to a spokesman for G.A.P., Dan Brown. It was small, to move swiftly through dangerous waters, and had a double bottom, a second layer of steel.

But the vessel did not have a double hull, a complete second steel sheath, the kind developed after the Titanic sank.

There appeared to be questions about its safety record. Mr. Brown said "some deficiencies" were found in tests in March in Chile and in May in Scotland. On its Web site, Lloyd's List said the British authorities had reported deficiencies, including missing rescue plans, and lifeboat maintenance problems, while watertight doors were deemed "not as required," and fire safety measures were also criticized.

The ship later passed a safety test with "flying colors," the company said, and Mr. Brown said the earlier problems "were not serious enough for the boat to be taken out of use."

The *Explorer* had been in trouble before, struggling in heavy Antarctic seas in the same region in February 1972 when it took on water. The passengers, mostly Americans, were rescued by the Chilean Navy. The ship was refurbished and went on to become the first passenger vessel to navigate the Northwest Passage at the other end of the globe.

On this trip, it left from Ushuaia, on the southern tip of Argentina, on Nov. 11, and was to return Thursday.

But the *Explorer*'s fate was sealed by yesterday afternoon, after hours of listing, awash in ice floes. Even its captain and chief officer, who had stayed to operate the bilge pumps in the hope of salvation, had long before evacuated when the Chilean Navy said the little red ship had gone down.

A few hours before, Stefan Lundgren, a member of the *Endeavour* staff who had also worked on the *Explorer*, described watching the ship fade. "For me she was a beautiful lady—boats are ladies," he said to a reporter aboard the *Endeavour*. "For every new owner, she gets a new face-lift. As an old woman, she's a tough lady. She doesn't want to give up, I can tell you." ❑

Explanation of MS *Explorer*'s Sinking Doesn't Hold Water

Experts pick apart the theory that the cruise ship, which sank Nov. 23 in the Antarctic, was damaged by ice.

***Christian Science Monitor*, 8 December 2007, by Colin Woodard**—People familiar with the Antarctic tourism industry weren't surprised that a cruise ship sank there.

What stunned them was that the ship in question was the MS *Explorer*, a veteran of the polar cruise ship trade, purpose-built to operate in extreme polar environments, and manned by an experienced crew. That it sank during what appears to have been the most routine of circumstances—cruising through young pack ice in mild weather—has experts scratching their heads.

"I'm totally shocked and surprised," says Leif Skog, who was captain of the *Explorer* for six years in the mid-1980s and early 1990s. "She was just outstanding in her design, perfect for ice navigation. It's very unlikely that pack ice caused this."

Jim Barnes, executive director of the Washington-based Antarctic and Southern Ocean Coalition, which monitors tourism and other activities, concurs. "To think [the *Explorer*] could sink in less than 20 hours from a relatively modest incident is very surprising," he says. "It makes you wonder if something else happened, because it really doesn't add up."

Indeed, the initial explanation of the ship's sinking on Nov. 23—that it struck submerged ice, sprung a "fist-sized" leak, and was doomed by uncontrollable flooding—doesn't hold water for ship-design experts. Essential pieces of the story are missing, they say. Those include what the vessel really struck, why flood control efforts failed, and the timing and nature of a second collision with a large iceberg.

Doubt cast on ice-damage explanation

Sander Calisal, professor emeritus of naval architecture at the University of British Columbia, notes that *Explorer*'s 1A-class ice-reinforced hull ought to have withstood accidental contact with submerged ice. "If there were some kind of underwater ice then, yes, there will be some impact, but I would assume it would be relatively minor." An iceberg large enough to cause serious damage would be readily visible to radar, sonar, and the eyes of the bridge crew.

Mr. Skog, Seattle-based vice president for marine operations at Lindblad Expeditions, *Explorer*'s original owner, says collisions with submerged ice are very rare events. In a polar career spanning three decades, he can recall only a handful of times when ships he served on experienced ice damage. All amounted to dents, save one incident when a cargo ship he was commanding suffered a small, easily contained leak in the Arctic.

Further, such damage almost always occurs in the bow area, which is double-hulled as an added precaution on ice-going vessels. But the *Explorer*'s leak had to be in the middle of the ship, he notes, because as she sank, she remained on a level, bow-to-stern trim.

The apparently small size of the puncture suggests the ship may have struck something harder than ice, according to Claude Daley, an expert in ice-reinforced ship design at Memorial University in St. John's, Newfoundland. "A fist-sized hole doesn't sound like ice damage to me," he says. "You need something very hard to cause a small hole in steel. Stone, for instance."

One possibility, says Skog, is a large stone embedded in floating glacial ice. "There can be huge rocks frozen into the ice, and they can be hard to see," he says. "When I was down there in the '70s, in poorly charted waters, you would see things that looked like little islands, but were actually floating."

Whatever caused the damage, Mr. Calisal says it shouldn't have sunk the ship by itself. "Passenger ships are designed with many watertight compartments to contain flooding," he says. "There had to have been a chain of failures to prompt the captain to abandon ship."

Explorer's owner, GAP Adventures of Toronto, is unable to provide further information on the incident, now that their insurance company, Steamship Mutual, is investigating, according Susan Hayes, the GAP Adventure's vice president for marketing. "We don't know exactly what happened," she said. "At this point, I'm not actively in the loop."

Reviewing the facts

Initial reports from the company—and accounts given by passengers and crew—suggest something unexpected happened aboard the ship while the crew worked to contain the damage.

The incident started about midnight local time (GMT-3), when the *Explorer* struck something, suffering damage amidships on the starboard side of the lowest passenger level. Passengers there recalled hearing two loud bangs and the sound of rushing water, as their cabins began to flood. They alerted the crew, and a distress call was sent out at 12:20 a.m.

While passengers congregated in the muster station on an upper deck, the crew located what Ms. Hayes said was "a crack and a fist-sized hole." The Toronto *Globe & Mail* reported Nov. 24 that the crew sealed the affected compartment with watertight doors and, for about an hour, appeared to have stabilized the situation with bilge pumps.

Several witnesses have since recounted that while they were waiting in the muster station, the *Explorer* drifted into a large iceberg. The iceberg—which one passenger described as being as big as the ship—reportedly struck the damaged starboard side.

Water levels reportedly began rising again sometime after 1:30 a.m., although it is not clear if this was a result of the second collision. Power failed, and, at about 3 a.m., Captain Bengt Wiman gave the order to abandon ship. Two other cruise ships arrived on the scene at about 7 a.m. to begin plucking passengers and crew from lifeboats and rafts. All 154 aboard were rescued. *Explorer*, which had rolled on her starboard side, reportedly sank that evening.

"The worst thing is that the ship probably sank with the secret of what really happened," says Skog, who hopes investigators manage to find the answer. "On our ships we need to know the facts; speculations aren't really fruitful for us." ❑

2007: Not a Good Year for Cruise Ships in Antarctica

***(U.K.) Ministry of Defence* press release, 1 February 2007**—Ice patrol ship *HMS Endurance* has assisted with the rescue of 280 passengers and 50 non-essential crew from a cruise ship damaged off the Antarctic peninsula.

On 30 January, she received an urgent call for help. The cruise ship *Nordkapp* had sustained damage to her hull as she transited out of Deception Island through Neptunes Bellows and requested the support of *Endurance*'s dive team.

[**Editor's Note:** *Nordkapp* ran aground on the northern coast of Entrance Point, very close to where the British whale-catcher *Southern Hunter* ran aground on New Year's Eve 1957 while trying to avoid a collision with an Argentine navy ship steaming in through the Bellows. Parts of the wreck are still visible today. *Nordkapp*, however, was not avoiding another ship.]

Overnight, *Endurance* made passage up to Deception Island and sent in one of her Lynx helicopters with a liaison team to establish the level of assistance required.

The 280 passengers of the *Nordkapp* are now safe and well and have been transferred to her sister ship the *Nordnorge* for their passage back to Ushuaia.

The 50 non-essential crew members were temporarily accommodated onboard *Endurance* before being transferred to Maxwell Bay, South Shetland Islands.

Luckily there were no injuries, and all aboard were very fortunate. There were lots of shocked people but all were pleased to see the Royal Navy's arrival.

Endurance Captain Nick Lambert described the passengers as "...pretty upbeat. The cruise ship had done a good job of looking after its passengers and, in the end, it was a pleasure to help."

Endurance's dive team are now investigating the level of damage sustained by the vessel's hull. Current estimates by *Endurance*'s ship's staff onboard *Nordkapp* indicate a 25m gash along the hull of the vessel which has ruptured several tanks and damaged the hull's outer plating.

There is currently a minor fuel leak from a ruptured fuel tank which is being contained by a boom, and Marine Pollution precautions are being taken by *Nordkapp*. Once the underwater survey has been conducted by *Endurance*'s divers, Det Norske Veritas, the *Nordkapp*'s insurers, will decide what actions are to be taken to ensure her safety and onward passage.

On the environmental impact of the fuel leak, Captain Lambert said:

"In this hugely sensitive environment even a drop of oil has a major impact and we can't pretend it's not leaking out. But the ship is doing its best to contain the leak with a boom and, luckily, a lot of organisations are now clicking in to help minimise any impact. Unfortunately, it is not yet possible to measure any long term effects."

Events such as the damage sustained by *Nordkapp* highlight the importance of *Endurance*'s surveying role within the Antarctic. Captain Lambert explained: "This is absolutely the reason we have *Endurance*. Antarctica is a pristine environment, and HMS *Endurance* is a key global change driver. Our work is crucial in understanding global change and climate warming. Our presence here in Antarctica also enabled us to assist those who visit this area but get into trouble." ❑

LA(Phot) Kelly Wyborow

HMS Endurance*'s Lynx helicopter circles above* Nordkapp*, with her sister ship* Nordnorge *in background*

Antarctic Tourism Undented After Sinking

***USA Today*, 30 November 2007, by Gene Sloan**—The foundering of *Explorer* on Nov. 23 in frigid Antarctic waters hasn't made a dent in demand for cruises to the region. "Not a single cancellation," notes Chuck Cross of travel agency Polar Cruises. In fact, business is busier this week at Polar Cruises as the firm fields calls from people scheduled on upcoming *Explorer* voyages who now are looking for a last-minute replacement. "The season is pretty much full" on every ship, Cross says. "We're trying to place them in any opening we can find." Tourism to Antarctica has quintupled over the past 15 years, to about 35,000 a year. ❑

Virtual Antarctica

Scientists have unveiled a new, high definition, interactive map of Antarctica. The Landsat Image Mosaic of Antarctica (LIMA) is the most geographically accurate depiction of the entire continent ever produced and is freely available to everyone over the Web.

Two web sites have been established: **lima.usgs.gov**, which provides zoomable, searchable capabilities from LANDSAT and from Canada's RADARSAT; and **lima.nasa.gov** which is more user-friendly with educational and interactive features.

The accuracy is said to be astounding, and the on-going capability will reveal changes in the topography, ice coverage/shrinkage and other aspects of the terrain over short periods of time. ❑

Sad Ending for "The Little Red Ship"

The original expedition-cruising ship Explorer *alternated seasons between Antarctic and Arctic waters*

***The Times*, 24 November 2007, by Will Pavia, Hannah Strange and James Bone**—They had paid more than £4,000 each for an adventure in the Antarctic Ocean. Last night the 24 Britons who had kept their spirits up by telling *Titanic* jokes as they drifted for hours in icy waters must have felt that they had got their money's worth.

The ship on which they were awoken by a loud bang soon after midnight became the focus of a huge rescue operation off King George Island involving the Chilean Navy and coastguards from Argentina, Britain and America.

With 67 fellow passengers, nine "expedition staff" and the 54 crew on board the stricken MV *Explorer*, they had been hustled into lifeboats at the crack of the polar dawn to float on a freezing sea beside the iceberg that crippled their vessel. Hours later, the abandoned cruise liner sank.

The passengers and crew were picked up by a Norwegian cruise liner five hours later. A minor international wrangle followed over whose base on King George Island should have the honour of receiving them. King George Island, the largest of the South Shetland Islands, is disputed territory. The Chilean Navy wanted them to be transferred to Chile and the Argentine contingent thought that they should go to Argentina, where the cruise began on November 11.

[PT Editor's Note: The ship was on the 12th day of a 19-day voyage. It had already been to the Falklands and South Georgia and was on its way to the Danco Coast, on the Peninsula's tip, when the incident happened.]

Safe and snug in the gym of the Chilean base on the island, Bob Flood, a British member of the *Explorer*'s expedition team, said: "After midnight we were going through a lot of ice. There was a lot of crunching. It did not seem to be anything out of the ordinary, but there was one big bang. A passenger shortly after reported water on the lower decks."

As the ship began listing, passengers were called to the muster station at about 1 am. "Then the electricity cut out, and we lost the engine," Mr Flood said. "At that time a large iceberg came and lodged itself on the starboard side of the boat. That would have prevented us launching the life boats. At 3 o'clock an order was given to abandon ship. A general Mayday went out."

No one panicked, and the passengers were in high spirits. "We knew there were ships not too far off," Mr Flood said. "There was a lot of joke-telling. It's the most bizarre thing that people tell *Titanic* jokes."

Andrea Salas, 38, a crew member, told a radio station in Argentina: "I was in the bar after midnight, with my colleagues and some passengers, when I saw people from the lower cabins, wet and shouting, 'There's water'."

There was a hole "about the size of a fist" and a crack in the hull, GAP Adventures, the tour operator, said yesterday. Ms Salas escaped in a lifeboat. She said: "There was wind and it was very cold, and we were wet because of the waves."

They were expected to spend the weekend in corrugated-iron cabins at the Chilean Eduardo Frei Montalva airforce base and the neighbouring Professor Julio Escudero Research Station. The 91 passengers had begun their "adventure travel experience" from Ushuaia on the southern tip of Argentina.

The 2,398-tonne *Explorer*, the "little red ship" famed as the first cruise ship designed for the fledgling Antarctic tourist industry, was built in 1969 in a Finnish shipyard by the pioneering tour operator Lars-Eric Lindblad. Equipped with an ice-resistant double hull, she was the first passenger ship to travel unescorted through the Northwest Passage.

A large Norwegian cruise liner, the *Nordnorge*, was deemed the most suitable to go to the cruise ship's aid. Captain Arnvid Hanson said that it took five hours to reach the stricken cruiser, by which time she was listing at 23 to 25 degrees. He said that all the passengers were fit and well.

***Agence France Presse*, SANTIAGO, 23 November 2007**—The 154 people rescued from a cruise ship that sank off Antarctica after slamming into an iceberg Friday were being transported to military bases on the frozen continent, Chilean military officials said.

The 91 passengers, 54 crew members and nine other employees from *Explorer* had earlier been transferred to a Norwegian cruise ship in the area after the collision before dawn on Friday.

Their disembarking from the Norwegian ship had then been delayed by rough weather.

Chilean Navy and Air Force personnel were now helping ferry 84 people to Chile's Frei military base, and the remaining 70 to Uruguay's Artigas military bases, both in Antartica, a Frei spokesman told reporters.

The 2,400-tonne Liberian-registered *Explorer*, run by the Canadian GAP Adventures company, finally sank at 1830 GMT, a Chilean navy icebreaker in the area reported.

The icebreaker said it was cleaning up a 180m long oil slick left by the sinking ship.

***Associated Press*, SANTIAGO, 24 November 2007, by Bill Cormier**—A small Canadian cruise ship carrying passengers who paid thousands of dollars to visit Antarctica struck an iceberg and sank hours later in icy waters. Everyone aboard escaped safely.

Its reinforced hull gashed and taking on water, the MS *Explorer* slipped beneath the waves Friday evening, about 20 hours after its pre-dawn accident near the South Shetland Islands, the Chilean navy said.

Initial reports suggested only a small hole was punched into the hull, but the Argentine navy later said in a statement it observed "significant" damage. Photos released by the Chilean navy throughout the day showed the ship lying nearly on its side, surrounded by floating blocks of ice.

Andrea Salas, an Argentine crew member aboard the *Explorer*, was quot-

ed as saying passengers felt an initial bump that seemed minor.

"Then we heard the captain announcing that there was another iceberg approaching us and that he was waiting ... for it to pass by," she told Radio Continental in Buenos Aires. "But that didn't happen," and there was a second, larger collision.

***Xinhua*, SANTIAGO, 25 November 2007**—The second and final group of 77 people rescued from the *Explorer*, a cruiser that sank Friday after hitting an iceberg in the Antarctic Ocean, landed in Punta Arenas aboard a military aircraft Sunday. The Chilean Air Force Hercules touched down just after 1:10 p.m. local time (1610 GMT) carrying among its passengers the 54 crew of the boat, which now lies 1,100m deep in the Bransfield Strait, 76km east of King George Island.

***Mercopress.com*, 25 November 2007**—Among those who fled the stricken MV *Explorer* after she struck an iceberg was a Danish tourist who suddenly proposed to his girlfriend as they sat frozen in their life-raft. Jan Henkel, 42, had planned to propose marriage to girlfriend Mette Larsen, 29, when the *Explorer* arrived in Antarctica—but his plans were thrown into disarray when the ship was crippled by an iceberg. At first he thought their lives might be over, but the couple both made it into a life-raft. And while his entire luggage was left behind, he had the engagement ring with him. He suddenly produced the ring without saying a word. Mr Henkel said: "When she saw the engagement ring, she said, 'Yes, that would be really great!' I feel wonderful, very pleased to be alive. Everybody was afraid to die, I think. There were some very frightening moments but the crew was very professional and the captain very good and had everything under control. On the honeymoon, we will go to a warmer place, I think."

***New York Times*, 25 November 2007**—From its beginning until its demise, the *Explorer* was an Antarctic pioneer. Launched in 1969 under the name *Lindblad Explorer*, it was the first ship built specifically to ferry tourists to Antarctica. When it disappeared beneath the polar region's waters last week, it became the first commercial passenger ship to sink there.

While the rescue may have been a success, the consequences for the Antarctic's fragile environment of having a submerged ship that is estimated to be holding 48,000 gallons of marine diesel fuel sitting off its coast are unclear.

And while the frontier nature of Antarctica is a large part of its tourist appeal, it also means that the region is a legal muddle. There are no obvious answers about who is responsible for dealing with any environmental damage the *Explorer* may cause or how methods can be created to prevent future sinkings.

"There's been kind of an explosion of tourism in Antarctica," said Jim Barnes, executive director of the Antarctic and Southern Ocean Coalition, an association of environmental organizations that participates in Antarctic treaty meetings. "Do we want this to become Disneyland or do we want some controls?"

Mr. Barnes, like many Antarctic experts, was surprised to learn that the *Explorer*, which was purchased by G.A.P. in 2004, had sunk. While not an icebreaker—a hull design impractical for passenger ships—the *Explorer* was specially reinforced to withstand blows from ice.

> *"On the honeymoon, we will go to a warmer place, I think."*

The company says it was certified at the highest rating given by Finland and Sweden for non-icebreakers. If its hull was breached, watertight compartments were supposed to contain the water and allow it to remain afloat.

Leif Skog, who captained the ship while it was owned by Lindblad Expeditions of Seattle, said, however, that the *Explorer* was designed to withstand the flooding of just one compartment. Any leakage of water into adjoining compartments, he said, would be sufficient to sink the ship.

"The compartment must be completely watertight," said Captain Skog, Lindblad's vice president of marine operations. "If you have a crack between two compartments, you have a problem."

G.A.P. initially attributed the sinking to a fist-size hole in the hull created by ice. But in an e-mail message on Sunday, Susan Hayes, its vice president of marketing, said that there was also a crack that, like the hole, could not be effectively sealed by the crew. It was not clear if the crack spanned compartments.

***PRNewswire*, 24 November 2007**—"It's a sad day for all of us who knew and traveled aboard the *Explorer*," said Sven Lindblad, whose late father commissioned the ship in 1969 for Arctic and Antarctic exploration. The ship was sold by Lindblad in 1982 and has had several owners since. GAP Adventures, a Canadian company, owned her most recently. "In some ways," said Lindblad, "ending her illustrious career in Antarctic waters, where she began, is fitting for a ship of her great stature. Certainly, her legacy will continue through the stories and memories she gave to all her knew her."

***BBC News*, 24 November 2007**—A British woman who was among 154 people rescued from the M/S *Explorer* has described her experience. Gillian Plant, 40, from Manchester, told the BBC news website it had been about midnight when the crew discovered the ship had started taking on water. "Everything on the ship had been fantastic, but then unfortunately the captain alerted us that they were aware there was a problem. We all got on warm clothing and co-ordinated in the area. We were then given a roll call to ensure that all staff were onboard and all passengers were present and we just waited while the engineers tried to sort the problem out. They couldn't sort the problem out and the captain said it was abandon ship. There was no panic at all." She described how they had got into the lifeboats before being lowered into the sea. "It was cold when we were sprayed with water but the weather was very good, so it could have been a lot worse. The weather was on our side. If we'd had bad weather it would have possibly been a different story. We were in the lifeboat about four-and-a-half hours. What was reassuring was when we saw the helicopter fly around, twice. At all times during the night, the captain kept us informed. Even when we were on the lifeboat we could hear the captain radioing round, telling the passengers how far the rescue ship was away and how long it would be. And he was checking each of the Zodiacs and lifeboats, checking that everybody was OK." She praised the captain for putting passengers' safety first, saying the rescue went so smoothly only because of his early decision to evacuate. ❑

NZ Retains Option To Make a Claim For Antarctic Seabed

***New Zealand Press Association*, 18 October 2007, by Kent Atkinson**—New Zealand is keeping its options open to match British plans to claim sovereign rights over a vast area of the seabed off Antarctica, says an academic who tracks issues involving the Law of the Sea and the Antarctic Treaty.

"New Zealand has reserved it's right to make a claim," said Karen Scott, a senior lecturer in law at Canterbury University. "But I think it would be quite unlikely to lodge a claim at this stage."

In April last year, New Zealand applied to the UN Commission on the Limits of the Continental Shelf to take over control of 1.7 million sqkm of seabed—outside the existing 200 nautical mile Exclusive Economic Zone—on the continental shelf around the mainland and its main islands.

Control of the additional area—more than six times the size of New Zealand and stretching in some places 563km from shore—will give NZ rights under the UN Convention on the Law of the Sea (UNCLOS) to billions of dollars worth of minerals and biological resources on the seabed.

But New Zealand did not ask for the seabed off its Ross Dependency in Antarctica, said Ms Scott: "New Zealand did not claim a NZ portion of Antarctica's seabed, but reserved a right to do so at a later stage".

Australia—which claims 42 per cent of the Antarctic—included data on the seabed off its Antarctic territory in its own UNCLOS claim.

"But Australia asked the commission expressly not to consider the Antarctic portion of its UNCLOS claim," said Ms Scott. She said some officials felt that by lodging the data for a claim, it was possible to keep open options for making that claim past the UN deadline—which was 2009 for many countries.

Now Britain is collecting survey data which will enable it make its own claim at the United Nations for Antarctic seabed. The Guardian newspaper reported such a claim was likely to signal a quickening of the race for territory in Antarctica.

The newspaper was told by Britain's Foreign Office the data is being gathered and processed for a UNCLOS claim to the UN which could give Britain oil, gas and mineral exploitation rights up to 350 nautical miles into the Southern Ocean.

One possibility might be for the UK government to lodge a legal claim with the UN's commission effectively park it for consideration at a future date.

Ms Scott said research voyages by NZ hydrographers and marine geologists likely meant NZ already had sufficient data to make a claim in the Ross Dependency.

New Zealand's is the smallest of the seven territorial claims in Antarctica which were effectively suspended by the Antarctic Treaty.

Many countries outside those seven did not agree that the territorial claims were legitimate, while countries such as the United States and Russia had kept open the option of making their own claims. ❑

Antarctic Notes

Taking Telescopes to Dome A

***Sydney Morning Herald*, 19 November 2007, by Richard Macey**—Next weekend Sydney astronomers will wave goodbye to an observatory destined for an Antarctic plateau 4100m above sea level. Built at the University of New South Wales and fitted with telescopes from China, the U.S. and Britain, the observatory will be operated via satellite from Sydney. Its installation will be the job of Dr Zhu Zhenxi from China's Centre for Antarctic Astronomy. Named PLATO, or Plateau Observatory, the cluster of telescopes built inside what looks like two small shipping containers will be trucked to Fremantle for collection by a Chinese icebreaker and 16 other members of Dr Zhu's team. At the Antarctic coast they will transfer to tractors for a 40-day,1300km trip to Dome foA.

Germany Sends New Base to Weddell Sea

***Australian Associated Press*, 18 November 2007**—Germany dispatched on Saturday a 26 million euro prefabricated research base to be erected next to the Weddell Sea's Atka Bay. Neumayer III will replace the existing Neumayer station which is drowning in snow. The new two-story base is equipped with hydraulic piles so it can be regularly jacked up to the level of the snowscape. The station was pre-assembled in Germany to check that everything works, then dismantled and packed in shipping containers. Assembly is to begin in December with commissioning set for early 2009. Neumayer III has a design life of at least 25 years; the existing station has lasted only 15.

NASA Tests Moon Unit at McMurdo

***NASA press release*, WASHINGTON, 14 November 2007**—NASA is sending a prototype inflatable habitat, one of several concepts being considered for astronaut housing on the moon, to McMurdo Station to see how it stands up during a 13-month test from January 2008 to February 2009. The structure looks like an inflatable backyard bounce house for children, but is far more sophisticated. Pressurized, insulated and heated, it has power, offers 384 sq ft of living space and at its highest point has an 8-foot ceiling.

Shirase on Final Antarctic Mission

***Daily Yomiuri Online*, 14 November 2007, by Katsutoshi Nisaragi**—Antarctic exploration ship *Shirase* is set to leave Harumi Pier in Chuo Ward, Tokyo, on Wednesday for its last mission. The icebreaker, which has carried about 4,000 people to Antarctica, first tackled Antarctic ice in 1983. *Shirase*'s successor is now being built.

Russian Antarctic Budget Up 15%

***www.kommersant.com*, 5 November 2007**—Russia's Antarctic budget has grown by roughly 15% to 2.4 billion rubles. The project to construct a new outpost at Progress station will get 108 million rubles till this year-end. "We have a real chance to revive Russkaya and Leningradskaya seasonal stations," 53rd RAE chief Vyacheslav Martyanov said. "The stations were closed for lack of funding in the 80s. Now we are intending to install meteorological and geophysical equipment there." Russia's polar explorers also plan to penetrate Lake Vostok.

China to Expand Antarctic Bases

***Xinhua*, BEIJING, 5 November 2007, by Li Huizi**—China is sending 189 construction workers on its 24th scientific expedition to Antarctica to expand two stations. The workers from the China Railway Construction Engineering Group will help extend Changcheng (Great Wall) and Zhongshan stations, projects to be completed in two to three years. The 219-member scientific team will fix the site of China's third station, a planned observatory with seven telescopes and one acoustic radar at Dome A. China's first expedition to the Antarctic was in 1984.

Chile to Reopen 'Arturo Prat'

***Santiago Times*, 26 October 2007**—Magallanes Region government, in Chile's extreme south, announced plans to reopen the "Arturo Prat" base on Greenwich Island in the South Shetlands, closed 5 years ago for lack of funding. But the Magallanes government, Chilean Navy and the Chilean Antarctic Institute (Inach) recently reached an agreement for its reopening and funding for the next 20 years. Inach plans to send scientists and to set up a laboratory.

New Island Near Palmer Honors Biologists

***Birmingham News*, 24 October 2007**—An island off the western edge of the Antarctic Peninsula has been named after Chuck and Maggie Amsler, a husband-and-wife team of University of Alabama at Birmingham scientists who have spent 30 years working in Antarctica. A triangular plot of land about 1.3 miles long and just over a half mile at its widest, Amsler Island was once thought to be part of Anvers Island. A glacier that covered the gap between the two

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Britain To Claim More Than 1m Sq Km of Antarctica

***The Guardian*, 17 October, 2007, by Owen Bowcott**—The United Kingdom is planning to claim sovereign rights over a vast area of the remote seabed off Antarctica, the Guardian has learned. The submission to the United Nations covers more than 1m sq km (386,000 sq miles) of seabed, and is likely to signal a quickening of the race for territory around the south pole in the world's least explored continent.

The claim would be in defiance of the spirit of the 1959 Antarctic treaty, to which the UK is a signatory. It specifically states that no new claims shall be asserted on the continent. The treaty was drawn up to prevent territorial disputes.

The Foreign Office, however, has told the Guardian that data is being gathered and processed for a submission to the UN which could extend British oil, gas and mineral exploitation rights up to 350 miles offshore into the Southern Ocean.

Much of the seabed there is at such a depth that extraction of gas, oil or minerals is not yet technically feasible, but the claim may still anger neighbouring South American countries who believe they have more entitlement to the potentially valuable territory.

The Antarctic submission reflects the UK's efforts to secure resources for the future as oil and natural gas reserves dwindle over the coming decades.

Last month the Guardian revealed the UK is working on three other sub-sea claims in the Atlantic: around South Georgia and the Falkland Islands, surrounding Ascension Island and in the Hatton/Rockall basin, west of Scotland. Britain has already lodged a joint claim at the UN—with France, Ireland and Spain—for a large area of seabed in the Bay of Biscay.

The Foreign Office confirmed yesterday that the UK was working to extend sovereign territory into new areas. "There are five claims in total that the UK is hoping to put forward," a statement said. "They are in the Bay of Biscay, around Ascension, off the British Antarctic Territory, around the Falkland Islands and South Georgia and in the Hatton/Rockall basin.

"We believe these five meet the geological conditions required. The claims are based on article 76 of the UN convention of the law of the sea."

The British Antarctic Territory, first claimed in 1908, forms a triangular wedge, with its apex at the south pole. It covers 666,000 sq miles and has two permanently-manned scientific stations. It is due to celebrate its centenary next year by issuing its first ever legal tender coin.

A British submersible recently dived to depths of more than two miles in the waters around the edge of the continental shelf. The seas are swarming with krill, shrimp-like crustaceans, brittle stars—which are similar to starfish—and sea cucumbers.

International interest in exploiting the new frontier on the oceans' floors comes as global warming is opening up previously frozen seas at the icecaps and the world's major economies are competing for fresh energy sources. During the summer Russia was subject to criticism for making claims beneath the Arctic Ocean, while France registered a claim to thousands of square miles around New Caledonia, in the Pacific.

The UK claim on Antarctica will be its most controversial because it depends on proximity to the British Antarctic Territory which overlaps rival land claims by Chile and Argentina. The environmental protocol to the Antarctic treaty, agreed in 1991, currently prohibits all mineral related activity, other than for scientific research.

Ministers will have to decide under what terms the application to the UN would be made. One possibility might be for the UK government to lodge a legal claim with the UN's commission on the limits of the continental shelf and effectively park it for consideration at a future date. The UN process allows states to extend their territorial rights over the ocean floor on an adjacent continental shelf up to 350 miles from shore. These applications may be limited by rival claims from neighbouring states. Submitting countries must demonstrate, with detailed geological and depth soundings, precisely the outer limits of the shelf. ❑

began receding noticeably by the early 1990s. The fast-receding glacier exposed about a 1,000-foot-wide channel between the islands in 2004.

CO_2 Levels Rise More Than Expected

***Press Association*, 23 October 2007**—Levels of carbon dioxide in the atmosphere have grown 35% more quickly than expected since 2000 because of inefficiency in fossil fuel use and the weakening of natural "carbon sinks," scientists warned. Increasing use of coal-fired power stations and a lack of technological improvements has led to a 17% increase of CO_2 above expected levels, researchers at the University of East Anglia said. There has also been a decrease in the ability of land and oceans to absorb CO_2, with the decline in efficiency of these natural sinks accounting for increases 18% above anticipated levels since 2000. Over half the decline of the carbon sink efficiency is the result of intensifying winds in Antarctica's Southern Ocean disrupting the sea's ability to store carbon. The new study's author Dr Corinne Le Quere, of UEA and the British Antarctic Survey, said winds are intensifying in the Southern Ocean because of climate change and depletion of the ozone layer. The stronger winds cause more "mixing" of the waters, bringing carbon up from the deep seas where it is stored and raising the carbon concentration of the surface water, which allows less CO_2 to dissolve into the ocean from the atmosphere.

Winter Test for Vitamin D

***Australian Antarctic Division press release*, 20 October 2007**—As people cover up to reduce the risk of skin cancer, some are no longer getting enough Vitamin D. Are supplements the answer? University of Melbourne researcher Sandra Iuliano last winter found that after 12 months in Antarctica 90% of the 130 expeditioners she studied were Vitamin D deficient, and their bone density at the hip was already up to 2% lower than when they arrived. The next crop of expeditioners will trial Vitamin D supplements to see if they can compensate for the lack of sunlight, needed to generate Vitamin D to build and maintain strong bones. Because there is very little vitamin D in food, without enough sunlight, levels drop.

Australians Ready A319 for Launch

***Flightglobal.com*, 18 October 2007, by Emma Kelly**—The Australian Antarctic Division's Airbus A319 has been performing ground crew and pilot training in Hobart, anticipating launch of flights in December from Tasmania to the new 4,000m Wilkins blue ice runway near Casey station. The twinjet will be operated by Sydney-based Skytraders, which already operates two ski-equipped EADS Casa C-212-400s for the Antarctic Division. The A319 is capable of carrying 19 to 40 passengers and up to 4.5 tonnes of cargo. The new 4.5-hour flight will replace a 10-day voyage. The aircraft is expected to fly the route 10 to 20 times each summer, for a five-year period. The lease of the A319 and construction of the ice runway is part of a US$40.9 million government-funded project.

Mild Temperatures Reduce 2007 Ozone Hole

***World Meteorological Organization*, GENEVA, 18 October 2007**—The Antarctic ozone hole in 2007 is relatively small, but its size is not a sign of recovery. Instead, it is related to the mild temperatures in the Antarctic stratosphere during the latest winter. The 2007 hole is relatively small both in terms of area (about 25 million sq km where the ozone column is less than 220 Dobson Units) and the amount of destroyed ozone. Ozone-depleting gases reached a maximum in the Antarctic stratosphere around the year 2000 and are now declining about 1% annually.

Ice Age Defrosted by Warming Ocean, Not CO2

***ScientificAmerican.com*, 28 September 2007**—New evidence from a marine sediment core from the deep Pacific points to warmer ocean waters around Antarctica—not greenhouse gases—as the culprit behind the thawing of the last ice age. By studying sediment cores from the deep Pacific near the Philippines, paleoclimatologist Lowell Stott of the University of South-

CONTINUED ON PAGE 30

ern California and his colleagues revealed that the temperatures of the deepest seas rose by around 2°C at least 1,000 years before sea-surface temperatures. "The deep sea warmed substantially before the CO_2 began to rise," Stott says. Because such deep seawater circulates from the coast of Antarctica, this deep-water warming implies that the Southern Ocean drove the last major climate change. Stott notes that the periodic wobble in the Earth's rotational axis described by the Milankovitch cycles led to more sunshine falling on the Antarctic at the same time—a likely cause of the warming waters.

Antarctica Snowmelt Moving Inland

***United Press International*, BALTIMORE, 24 September 2007**—NASA scientists studying 20 years of data from space-based sensors found Antarctic snow is increasingly melting farther inland and at higher altitudes. The discovery is significant, scientists said, since Antarctica contains 90% of Earth's fresh water, making it the largest potential source of sea level rise. It is also a place where snow melting is limited because, even in summer, most areas typically record temperatures well below zero. NASA scientists using data collected from 1987 to 2006 found snow is now melting as far inland as 500 miles from the Antarctic coast and as high as 1.2 miles above sea level in the Transantarctic Mountains. The research, reported in *Geophysical Research Letters*, also confirms that melting has increased on the Ross Ice Shelf, both in geographic area and in duration.

E. Coli Found in Antarctic Seals

***NewScientist.com*, 4 September 2007**—For the first time, researchers have found a virulent human infection in Antarctic wildlife. As reported in *Polar Biology*, scientists at the University of Kalmar in Sweden discovered the strain of bacterium *E. coli* strain in faecal swabs from fur seal pups near the Chilean research station on Livingston Island. The bug has never before been found in seals. The same team has also found strains of Salmonella and Campylobacter that cause less virulent human gut infections in wildlife near science stations. There are fears that visitors are introducing foreign organisms. Pathogens are a particular worry as many Antarctic creatures breed in colonies, where disease would spread rapidly.

Robots to Aid Chinese Expedition

***Reuters*, BEIJING, 26 Aug 2007**—A robot that can fly "like a mini-helicopter" at speeds of 50 to 100 kph and a second that can glide across ice will aid Chinese scientists during an Antarctic expedition slated for October, Xinhua news agency reported. The airborne robot, weighing 20kg, can carry 5kg and fly for one hour. It will be equipped with a camera and an infrared radiometer for observing ice on the sea. The second tank-like robot, which can move on ice, weighs 200kg and can carry 40kg. It can also pull objects weighing 100kg with a maximum working radius of 25km, sliding across ice crevasses and snowy slopes. "The use of robots can reduce the risks and costs in scientific research," Qin Weijia, of the Polar Research Institute of China, told Xinhua. "No matter how bad the weather is, they can still work normally."

High Peaks Remnants of Vast Plateau

***LiveScience.com*, 23 July 2007, by Charles Q. Choi**—The origins of the highest peaks in Antarctica have long been shrouded in mystery. The world's highest mountain ranges typically formed when massive tectonic plates crashed against each other. However, geologists have agreed for years, the Transantarctic Mountains apparently emerged as the Earth's crust rifted apart. But mountains that form from such rifting are not supposed to rise nearly as high as the Transantarctics. Geophysicist Michael Studinger, of Columbia University's Lamont-Doherty Earth Observatory, and his colleagues now suggest the range is the remnant edge of a gigantic plateau the size of France that was 3km high or more—and these peaks are high now because they were already high long ago. The researchers, who detail their work in August's *Geology,* propose that the interior of this conjectured plateau collapsed somewhat like a failed soufflé.

Penguins Map Glaciers' Advance and Retreat

***University of North Carolina Wilmington press release*, 20 July 2007, by Dana Fischetti**—Although Antarctica's massive ice sheets have advanced and retreated for thousands, perhaps millions, of years as earth's atmosphere cooled and warmed, until recently there was no precise way to measure the shifting interface between ice and open water. By radiocarbon dating Adélie penguin remains, marine ornithologist Steven D. Emslie has determined a history of rookery locations that spans the last 45,000 years, the longest record for any species of penguin. He charted the ancient colonies' population shifts with climate change data and sea-ice extent to create a new and reliable method of dating ice movement (see January 2007 *Geology*). Adélies return to the same nesting site year after year and leave behind a wealth of debris, including bone, tissue, feathers, feces and eggshells, almost perfectly preserved in Antarctica's frigid, dry atmosphere. By locating and dating the presence of Adélie colonies, Emslie determined that the Ross Ice Shelf advanced northward until about 13,000 years ago, when it began retreating at the end of the last ice age.

New Images Challenge Ideas About Ice Sheet

***University of California, Santa Barbara (UCSB)* press release, 29 June 2007**—Echo-sounding images of areas below the eastern Ross Sea provide evidence that West Antarctica was involved in the general growth of the Antarctic Ice Sheet as it formed many millions of years ago, according to UCSB scientists. This has not been demonstrated before now in areas adjacent to the continent, said Bruce Luyendyk, professor of marine geophysics and Earth science at UCSB, and co-author of a paper describing the study in the May *Geology*. "Much more of the continent was hosting an ice sheet at the start of 'icehouse' Earth, than previously suspected."

East Antarctica Ice Sheet Remains Stable

***Associated Press*, WELLINGTON, 27 June 2007, by Ray Lilley**—The world's largest ice sheet—with enough water to raise global sea levels by 60m—is relatively stable, new research says. While the Greenland and West Antarctic ice sheets are both at risk from global warming, the East Antarctic ice sheet will "need quite a bit of warming" to be affected. The air over the East Antarctic ice sheet will remain cold enough to prevent significant melting for at least 100 years, according to New Zealand-led research published this week in the journal *Geology*. ❑

Anti-Whaling Group Dubs Ship 'Steve Irwin'

***Associated Press*, MELBOURNE, Australia**—A conservation group, vowed to disrupt Japan's annual whale hunt, launched its Antarctic campaign Wednesday by renaming one of its ships after "Crocodile Hunter" Steve Irwin, late environmental campaigner.

The U.S.-based Sea Shepherd Conservation Society says it will use whatever means necessary to block Japan from harvesting up to 50 humpbacks, 935 minkes and 50 fin whales in Antarctic waters as part of a research program critics decry as commercial whaling in disguise. ❑

UN Chief Visits Antarctica

His Antarctic welcome: Johnny Walker Black on 40,000-year-old rocks

***BBC News*, 11 November 2007, by Gideon Long**—United Nations Secretary General Ban Ki-moon described his alarm at the pace of climate change after a two-day fact-finding trip to southern Chile and Antarctica.

Mr. Ban, who has vowed to make the fight against global warming a key issue during his tenure, went to Antarctica on Friday where he heard from scientists how rising temperatures have caused huge ice shelves to collapse.

The first head of the UN ever to visit Antarctica, Mr. Ban is gathering information to take to a major UN conference on climate change next month.

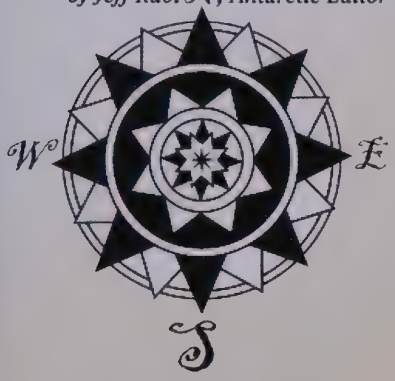
Among the scientists who briefed him was Gino Casassa, one of Chile's leading experts on climate change, who noted: "The Antarctic Peninsula is one of the three [climate change] hotspots on earth and the temperature increase here over the last 50 years has been up to 10 times the global average."

The UN secretary general said the world had to do more to safeguard the future of the planet. "I'm not here to frighten you, I'm not scaremongering. But the world is changing, the glaciers are melting—the change is now progressing much faster than I had thought. It's alarming."

*(**Polar Times Editor's Note:** Mr. Ban visited Chile's Eduardo Frei Montalva base, Uruguay's Artigas station and South Korea's King Sejong station during a day trip to King George Island along with his wife Yoo Soon-taek, Chil ean Environment Minister Anlia Uriarte and about 20 reporters. Scientists welcomed him to Antarctica with a glass of Johnny Walker Black Label served "on the rocks" with 40,000-year-old ice.)* ❑

Due South

by Jeff RubiN, Antarctic Editor



Shackleton's Biscuit

Twenty-two days after Ernest Shackleton and his three companions on the 1907-09 Nimrod Expedition—Jameson Adams, Eric Marshall and Frank Wild—turned back from their attempt on the South Pole (that turn being the hardest decision of Shackleton's life, about which he later told his wife Emily, "I thought you'd rather have a live donkey than a dead lion"), Shackleton performed one of those small acts that throw into high relief a person's true character.

For ten weeks, the foursome had trudged across the Ross Ice Shelf and up the Beardmore Glacier, manhauling their overburdened sledges and pioneering the route to the polar plateau. They reached their Furthest South—within 180km of the Pole—on 9 January 1909. By then, dangerously dwindling food supplies forced them to turn and run for their lives toward their base at Cape Royds.

On 31 January 1909, as the struggling men—ill with dysentery—were finishing breakfast, Shackleton noticed that the badly-weakened Wild was unable to force down either the pemmican or the horse meat, their only remaining food aside from the sledging biscuits.

By then, each starving man's ration was just four of these biscuits a day.

Out of view of the others, Shackleton quietly insisted that Wild accept one of his biscuits.

It was an act of supreme kindness.

Underlining every word for emphasis, Wild noted in his journal that evening that Shackleton had gone even further "and would have given me another tonight had I allowed him."

"I do not suppose that anyone else in the world can thoroughly realize how much generosity and sympathy was shown by this," Wild wrote. "I DO by GOD I shall never forget it. Thousands of pounds would not have bought that one biscuit."

For three more days, the men slogged on through soft, knee-deep snow, 12 miles or more each day, finally reaching another food depot just as their provisions ran out.

Eventually, they returned to their base and then home to England to fame and glory.

They had, after all, achieved a remarkable run, despite their close call with extinction. They surpassed Robert Scott's furthest south by 589km, discovered nearly 800km of new mountain range, and showed the way to anyone who would come after them to try for the Pole.

Perhaps it is just another sign of our capitalistic Gilded Age that small pieces of that reflected glory are now for sale—giving Wild's poignant diary entry an irony he could never have intended.

At an auction held at Christie's London headquarters in 2000, a hard square sledging biscuit from the Nimrod expedition sold for £4,935.

Another Nimrod biscuit was offered by Christie's at a sale in late September.

In fact, for more than a decade now, auction houses small and large have put on the block a steady stream of historic Antarctic and Arctic objects—not just diaries, logbooks and other manuscripts, but hats, gloves, parkas, skiis, sledging harnesses, binoculars, sextants, chronometers, compasses, penguin eggs, paintings, photographs, wine, cigarette cases, medals, flatware, crockery...the list goes on.

In short, you can find for sale practically anything associated with polar exploration, particularly (though by no means limited to) objects that actually went with an expedition to high latitudes.

APS member Robert Stephenson operates the terrific website Antarctic-Circle.org, a sort of online Center for Antarctic Humanities with dozens of articles about Antarctic history, art, theatre, poetry, music, books, maps and trade cards. His "works-in-progress" section is a must-read goldmine for Antarctic bibliophiles anxious to learn about soon-to-be published books.

Rob has been following polar auctions for years. He tracks upcoming sales, posts descriptions of sale highlights, and updates with the prices realized.

Even Rob is often amazed by the steady flow of material unearthed by the auction houses. Back in 2000, he wrote, "Will the flow of stuff ever end?!" The answer is clearly "No," as auction house staff tirelessly pursue their quest to bring new material to market.

Passengers on Antarctic tour ships talk excitedly about visiting stations, but usually not because they are so curious about the research being performed at some of them. Instead, they are anxious—one could often say "almost frantic"—to indulge in some "retail therapy," loading up their backpacks with postcards, T-shirts, stamped envelopes and other trinkets.

They are desperate to buy things, to bring home *something* from the seventh continent.

Maybe this desperation is made worse by the fact that Antarctica has no native handicrafts, nothing of local manufacture—and souvenir-collecting of natural or human-made objects is strictly prohibited by the Antarctic Treaty.

In a way, the polar artefact market is merely "retail therapy" on a much more expensive scale.

For some people, owning an object that once belonged to a great explorer (or scientist or artist) seems to confer a feeling of connection with the past that is unreachable any other way.

A friend of mine actually owns one of Captain Scott's last tobacco pipes, found in the tent with his body and those of his sledging companions after they died on their horrendous return from the Pole. The pipe was sold at auction by Scott's descendents and my friend gladly paid a dear price for it. Although he has not yet smoked Captain Scott's pipe himself, knowing that he *can*, any time he chooses, gives my friend a singular satisfaction.

The small round Nimrod biscuit offered by Christie's on 26-27 September—probably reflecting the fact that it was a Huntley & Palmers, not likely the type taken out in the field by the explorers—was estimated to bring up to £1,500 at auction.

Aspiring collectors, or anyone else wishing to hold a piece of Antarctic history, can still fulfill their ownership dreams. It went unsold. ❑

Moving In for the Krill

The next big thing in yogur flavors?

Courtesy Australian Antarctic Division

***Sydney Morning Herald*, HOBART, 5 November 2007, by Andrew Darby**—Industrial fishing companies are gearing up to exploit Antarctic krill. After decades of trying, the puzzle of krill exploitation has been solved and super trawlers are being equipped for the giant polar fishery.

> *Krill is at the centre of the polar food web, providing the main food for most use as human food has been restricted by the speed at which it rots.*

Plans to take up 746,000 tonnes a year were disclosed at the annual meeting of the 25-nation Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), where members agreed on new measures to control krill fishing. For years the catch had hovered around 100,000 tonnes.

But concerns remain about potential ecological costs of the fishing effort, particularly by pair trawlers, which are banned in some seas because their giant nets can snare mammals.

The best estimate of the amount of krill in the Antarctic is half a billion tonnes, said Steve Nicol, a senior scientist at the Australian Antarctic Division.

In an area of the Southern Ocean off the Australian Antarctic Territory a catch limit of 2.6 million tonnes has been set, out of an estimated biomass of 15.9 million tonnes.

"Our concern is that we have catch limits set in fairly large areas," Nicol said. "Despite the size of these catch limits, it is possible to take them out of a very small area, meaning there could be strong local effects."

Krill is at the centre of the polar food web, providing the main food for most Antarctic birds and marine mammals. Its use as human food has been restricted by the speed at which it rots.

But new fishing and processing techniques mean the highest catch—528,000 tonnes by Soviet fleets in 1982—is likely to be eclipsed soon. There is escalating demand for krill, particularly in the aquaculture and pharmaceutical industries and as a source of food additives.

A Norwegian company, Aker, appears to have cracked the processing puzzle by using a giant hose to pump the catch from nets directly into the factory on its trawler, *Saga Sea*. Able to catch about 50,000 tonnes of krill a year, it will be eclipsed by a new Aker ship, the 121-metre *Atlantic Navigator*, which the company is converting in a AU$100 million investment in krill fishing.

CCAMLR heard at its annual meeting last week of plans for seven Dutch-owned pair trawlers to enter the krill fishery, along with vessels from another seven countries. The pair trawlers would drag between them a net with a mouth hundreds of metres wide, while a third vessel would follow, pumping krill out of the narrow end of the net, known as the codend.

Pair trawlers are thought to be effective because fish are less alarmed by the noise of the vessels, which are further away from the net mouth. But this may also fool dolphins and other marine mammals. Britain banned pair trawlers in the English Channel in 2004 after a Greenpeace campaign highlighted the deaths of hundreds of dolphins.

The Antarctic and Southern Ocean Coalition said the expanding fishery might pose a large threat to krill predators, especially penguins. "If you mess up with krill," said a coalition campaigner, Virginia Gascon, "you mess up the entire ecosystem."

Among the many uses of krill is as aquaculture feed. Krill stimulates growth and encourages immunity to disease, and replaces artificial colouring used to redden farmed fish flesh with a natural pink.

> *The French dairy giant Yoplait is working to develop krill oil products.*

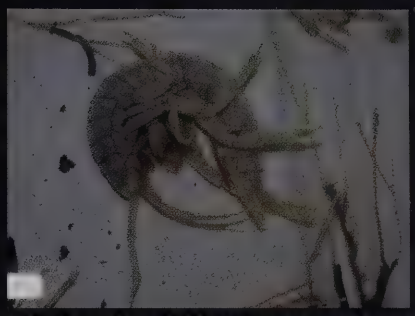
Krill oil is less than 5% of krill by weight, but its uses are multiplying. High in omega-3 fatty acids, it can be used in aquaculture or for human nutrition. The French dairy giant Yoplait is working to develop krill oil products.

Even the shell of krill can be used—as a base material for contact lenses and artificial skin. ❑

Scientists Find New Life in Deep Antarctic Seas

British Antarctic Survey Press Office—Scientists have found more than 700 new species of new marine creatures in the vast, dark deep-sea surrounding Antarctica. Carnivorous sponges, free-swimming worms, crustaceans, and molluscs living in the Weddell Sea provide new insights into the evolution of ocean life.

Gastropod: *This new small species lives on the Antarctic deep sea floor. The shell and the snail within it can be seen through a layer of mantle tissue that protects the shell. Although living in dark depths, this species has developed eyes.*



Giant amphipod: *Most deep-sea crustaceans are less than 1 centimeter in size, but this species of* Paraceradocus *can reach more than 5cm in length. The white color is an adaptation to the deep sea, as related species from shallow Antarctic waters are bright red.*

Carniverous moonsnail: *This moonsnail can detect food from a long distance and move to it. Polyps covering its shell use the moonsnail as transport to food sources.*

Photos by British Antarctic Survey (BAS)

Reporting this week in the journal *Nature*, scientists describe how creatures in the deeper parts of the Southern Ocean—the source for much of the deep water in the world ocean—are likely to be related to animals living in both the adjacent shallower waters and in other parts of the deep ocean.

A key question for scientists is whether shallow water species colonised the deep ocean or vice versa. The research findings suggest the glacial cycle of advance and retreat of ice led to an intermingling of species that originated in shallow and deep water habitats.

"The Antarctic deep sea is potentially the cradle of life of the global marine species," says lead author Professor Angelika Brandt from the University of Hamburg. "Our research results challenge suggestions that the deep sea diversity in the Southern Ocean is poor."

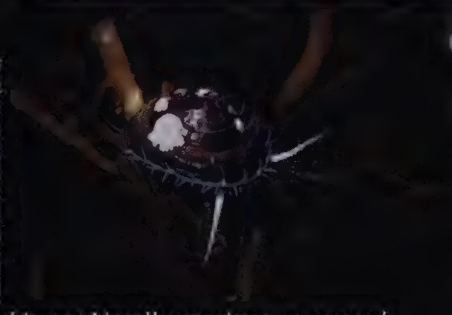
***Antarctic springtail* Cryptopygus antarcticus:** *One of the most successful terrestrial arthropods to have colonized the Antarctic continent. Although only 1-2 mm long and weighing only a few micro-grams, it is one of the largest animals to complete its lifecycle on the Antarctic continent. The springtail, which is actually an iridescent black colour, avoids freezing by accumulating antifreeze compounds.*

Amphiod crustacean: *The crustacean family* Epimeriidae *have successfully developed new species in Antarctica. This pink species is new to science and the first deep sea member of this group.*

Dr Katrin Linse, marine biologist from British Antarctic Survey, says, "What was once thought to be a featureless abyss is in fact a dynamic, variable and biologically rich environment."

Three expeditions, part of the ANDEEP project (Antarctic benthic deep-sea biodiversity), took place aboard the German research ship Polarstern between 2002 and 2005. An international team from 14 research organisations investigated the seafloor, its continental slope rise and changing water depths to build a picture of this little known region of the ocean. ❑

Limpets May Point to Future Fate of Antarctic Marine Life



Photos by British Antarctic Survey (BAS)

Limpet Nacella concinna *on seaweed*

***British Antarctic Survey press release,* 23 July 2007**—A limpet no bigger than a coin could reveal the possible fate of cold-blooded Antarctic marine animals, according to new research published in the *Journal of Experimental Biology*. Compared to their temperate and tropical cousins, cold-blooded polar marine animals are incapable of fast growth.

Until now scientists assumed that a lack of food in winter was the major limiting factor. Studies of the protein-making abilities of the Antarctic limpet *Nacella concinna* in both the sea around Rothera Station and in the lab aquarium reveal that these animals cannot efficiently make proteins, the building blocks of growth.

The Antarctic limpet is an extremely common shallow water species. In some areas hundreds of individuals can be found per square metre of seabed. This limpet forms an important part of the diets of many seabirds, fish and starfish.

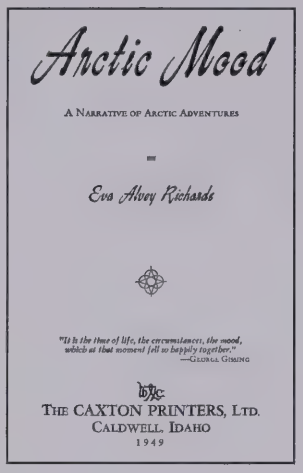
Says lead author Dr Keiron Fraser: "If cold-blooded Antarctic animals can't grow efficiently, or increase their growth rates, they are unlikely to be able to cope in warmer water, or compete with species that will inevitably move into the region as temperatures rise."

Growth in animals occurs primarily by making and retaining proteins. While tropical water limpets typically retain 70% of the proteins they make, those in the Antarctic appear only to retain about 20%. ❑

Who Was Eva Alvey Richards?

Reveiewed by Sheldon Bart

My mother lived across the street from Queens College, a branch of the City University of New York. Consequently, I did a lot of research in the Queens College library. That way I was able to take care of her and take care of business at the same time. The library frequently had book sales in its spacious lobby. At one of those sales, for the price of a dollar, I picked up a copy of a hardcover called *Arctic Mood: A Narrative of Arctic Adventures*. It was published in 1949 by a small press out of Caldwell, Idaho. The copy that came into my possession was formerly owned by the Hicksville High School Library of Hicksville, New York. The inside rear cover had a Hicksville High School Library card-sleeve and "Date Due" slip pasted in it. The book had been checked out of Hicksville High at various times in the 1950s, according to the due dates. The author was a woman named Eva Alvey Richards.


Arctic Mood
A Narrative of Arctic Adventures
Eva Alvey Richards
"It is the time of life, the circumstances, the mood, which at that moment fell so happily together."
—George Gissing
The Caxton Printers, Ltd.
Caldwell, Idaho
1949

I bought the book principally because, on thumbing through it, I noticed an anecdote about the legendary explorer Roald Amundsen, which I figured would come in handy for one of my writing projects. I took some notes on the Amundsen story and left *Arctic Mood* in my mother's closet. It remained there until my mother died, then it traveled to my apartment in New Jersey and joined my collection of out-of-print exploration books.

I read it only recently. It is not only the best Arctic book I ever read—it is one of the best books I ever read. This is one of the ten books I would take with me to a desert island (or, preferably, to an Antarctic advance base). Richards spent a year—1924—among the native people of Wainwright, a village on Alaska's Arctic coast. She lived and worked there as a teacher and nurse. Two decades later, she brought her experiences to vivid life in a loving, engrossing memoir that transports the reader right back to that time and place.

In beautifully compelling prose, she recreates one year in the life of a community at the edge of the Arctic Ocean. From the fall reindeer round-up in a corral made of lake ice, through the long winter night, to the whaling and trapping that followed the return of the sun, and the walrus hunting and reindeer grazing on the heels of the midsummer thaw, Alvey details the sights, sounds, smells and also the "feel" of these events.

Yes, feel. Here's an example, from Alvey's account of the aftermath of a successful whale hunt: "There isn't anything on this earth that I can compare with the experience of walking on a whale," she wrote. "You might try walking on a wet rubber mattress with very pliant springs hidden within. Perhaps piling up three mattresses would be better, then walk about on the top one. This would only give you the sensation of sinking in as if presently you might step straight through to the ground mattress. But the slick, greasy uncertainty of each step you wouldn't get at all, to say nothing about losing your balance and coasting oilily down to the tail flippers, if you were lucky enough to be headed that way."

Alvey was billeted in a wooden building that functioned as a schoolhouse, living quarters and general store. No homebody, she mingled with the community and happily accompanied her native friends on sledge trips including a 200-hundred mile trek from Wainwright to Point Barrow and back. She wore native parkas and slept in igloos on the trail, and wherever she went and whatever she did, she had the knack of writing magical sentences that immerse the reader in everything she experienced. Like this one, excerpted from the Barrow trek:

> "Nine dogs trotted in fine mettle, their tails a parade of plumes." Life in the north, as elsewhere, had its moments of tragedy. One of Alvey's most moving passages concerns an influenza epidemic that struck Wainwright during the winter frost with temperatures falling as low as minus 54 degrees:Formulate what you will of a sound philosophy of life, some cherished theory you believe will tide you,equip you with strength of heart and good courage for the difficulties of this world, and then meet up, face to face with a crisis like this....Old spectacled Philosophy tiptoes out of the picture...and as for your theories, they are like dogs with frozen feet, helpless. So you make the rounds of the village dispensing quinine and camphorated oil and enemas and hot-water bags and pneumonia jackets, salts and caster oil and cough syrups—all these, trying in every way to find surcease for the kindly people who had never harmed a soul, lying in their igloos helpless and suffering looking to you for relief. And you sleep in a chair with your clothes on, and keep up the fires, and after awhile you get very tired and you kneel down and ask God to do something about it, and there comes only the dismal moaning of the storm for an answer, or the shuffling of *mukluks* in the hall—some feverish one after medicine again.

Eva Alvey Richards at Wainwright, Arctic Alaska

Detailed map on inside front cover of Richards' book

Her most notable achievement, however, might be her portrayal of the people of the north.

She depicted the villagers not as a nameless, faceless mass, but as *people*, emphasizing their warmth, resilience, resourcefulness and, above all, individuality. There was Tooruk, the best student in Alvey's class, reflective, reliable, and accomplished at every outdoor task. Elenaua, a kindly woman who shared a sledge with Alvey and kept reaching back to touch Alvey's cheeks to check for frostbite. Musinginga, the illegimate daughter of an Anglo whaler and a native woman, blue-eyed and unashamed. And many others.

The only character that is not fleshed out is Alvey herself. Who was this woman who went north *alone* one year before even Richard Byrd and Floyd Bennett set foot on the ice? Who, in a Euro-centric era ingratiated herself with a northern community on terms of mutual respect? Googling her name brought up only book dealers selling copies of *Arctic Mood*. Where was she from? What had she done? Where else had she gone, and what else did she write?

The only thing I know about her is what can be gleaned from the pages of her book: She had a son and a daughter (the book was dedicated to them and to Alvey's father). She spent a year—1923—working as a nurse at Maynard-Columbus Hospital in Nome (that's where she met Amundsen.) She was a talented artist as well as a writer drawings and paintings of northern subjects, and many of her own photographs). She was bright, adventurous, upbeat, compassionate. But beyond this, she remains a mystery.

If any of the readers of *The Polar Times* knows anything about this woman, please get in touch with me at **wildresch@aol.com**. I will report whatever we might learn in a later article. It would be only fitting for the first biographical sketch of Eva Alvey Richards to appear in the magazine of the American Polar Society. ❑

Sheldon Bart is a member of the Board of Governors of the American Polar Society, and president and founder of Wilderness Research Foundation

Cool It: The Skeptical Environmentalist's Guide to Global Warming

by Bjorn Lomborg
Alfred A. Knopf, New York 2007

Reviewed by Cliff Bekkedahl

What a relief—to find a cool and intellectually refreshing antidote to the hype and hysteria of the global warming doomsayers recently reenergized by the Nobel Committees' awarding of the Peace Prize to Oscar-winning Al Gore and the United Nation's Intergovernmental Panel on Climate Change[IPPC].

The author, named in 2004 as one of the 100 most influential people in the world by *Time* magazine, is an economist and adjunct professor at Copenhagen Business School and the founder of the respected Copenhagen Consensus, a conference of the world's top economists who come together to prioritize the best solutions for the world's greatest challenges.

Using the basic analytic tools of his profession, Lomborg respectfully but relentlessly dismembers the hyperbole and apocalyptic pronouncements of the global warming uber alles crowd that has garnered public attention in recent years.

He clearly acknowledges the not-so-gradual warming of the earth's atmosphere and that man has contributed to the phenomenon by projecting massive amounts of CO_2 skyward over the past 100 years and continues to do so at an increasing rate, as heretofore undeveloped nations expand their industrial capacity and carbon-based energy usage. No argument here. But no one is quite clear as to how much or little man's contribution has been or will be to the global warming equation. Nevertheless, Lomborg argues that CO_2 emissions should be reduced worldwide; but whatever reduction policies, whatever the measures utilized and whatever the amount of resources are devoted to these efforts, they should be in consonance and prioritized with other challenges facing mankind.

> *The author cites ... indisputable challenges to mankind [that] could be rectified at a fraction of the costs that the Kyoto I or Kyoto 2 advocates propose.*

This is a book about perspectives and priorities —Econ 101, back to basics! With limited resources what are the most cost effective choices? Eliminate CO_2 emissions? 90% ? 50% ? At what cost? $100 billion? Several trillion? What is the cost-benefit ratio[s] involved in carbon emission reduction? Are there better ways to apply global resources? Are there more immediate and pressing problems confronting mankind? Lomberg offers well reasoned answers that concerned readers of this journal should consider.

To make his case the author addresses many of the doom-and-disaster assertions: Are polar bears endangered by global warming? What can be done about melting glaciers? What will happen to poor farmers in the marginal zones as the earth heats up? How many annual deaths can we expect as heat waves engulf developed and undeveloped countries? Will the Gulf Stream come to a halt, and what are the ramifications if and when it happens? When will malaria become endemic in Vermont? Seas rising, millions threatened, how will Manhattan survive? Will the economic and political repercussions of global warming lead to nuclear war? In sum, he addresses all of the worst-case projections being advanced by the media and currently resonating in the political arena.

You can search out answers to these questions in a host of current books, docudramas, action movies and blogsites and find all degrees of fear, terror and disaster as the last days of mankind wind down—Hollywood science at its best. But instead, I urge that you get a copy of *Cool It* if you want a rational and balanced perspective of global warming and the challenges of the twenty-first century.

The author cites a whole array of indisputable challenges to mankind: AIDS, inaccessibility of potable water in undeveloped countries, elimination of waterborne diseases that kill or cripple millions of people annually, malaria that infects and kills 1,000,000 people a year and debilitates many times that number, farm subsidies in developed countries that deny markets to third-world agriculture and more. All these problems are far more devastating to mankind than the worst-case "Inconvenient Truth" scenario and could be rectified at a fraction of the costs that the Kyoto I or Kyoto 2 advocates propose.

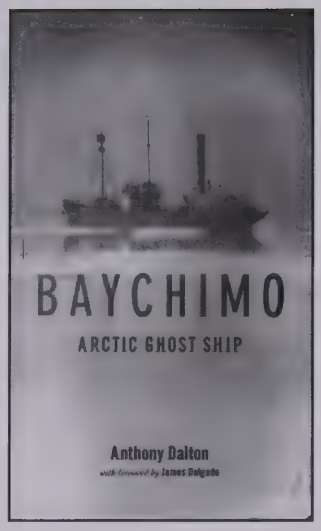
Why not do both, reduce drastically CO_2 emissions as necessary to effect the predicted temperature increases and also do the other good things like eliminate malaria? First of all, the cost of making any discernible impact on temperature reduction is actually prohibitive. Carbon taxes or other measures to provide incentives to nations to reduce significant amounts of carbon emissions are totally unrealistic financially and politically, and indeed, for some nations, suicidal. Second, resource commitments to other problems offer far higher returns in benefits to people while, concurrently, investment in measures to prevent or remediate any problems generated by global warming (e.g., flooding, hurricane damage or other events that could be attributed to global warming) is far more cost effective than trying to reverse trends in weather or temperature that may be only partially connected to greenhouse gas accumulation in the atmosphere.

The author contends that a worldwide investment in R&D of $25 billion annually over the next century to develop non-carbon emitting energy sources is a far better option than the $180 billion per year that Kyoto 1, a treaty already defunct and called "symbolic" by the *Washington Post,* would have cost. The clear and present danger is that the Kyoto 1 advocates are gearing up for Kyoto 2, and the cost of that will be out of sight.

Hopefully, cooler heads—inspired by *Cool It* and similar expositions—will derail the global warming warriors who seem bent on squandering precious time and untold trillions on a tangential effort to alter reality.

This is an important book but certainly not the last word in the global warming debate. Be assured, however, that the author has carved himself a future role in the defining of global issues through his measured approach to evaluating their cost-benefit ratios. The pressing question is when will the debate move forward in a rational context. One humble observer suggests this will only happen when responsible scientists distance themselves from the unqualified and self-serving alarmists and their tales of fear, terror, and disaster.

Google the author, and I'm confident your next couple of clicks will take you to Amazon or Barnes & Noble for a copy of *Cool It*. ❑



Baychimo: Arctic Ghost Ship

by Anthony Dalton
Surrey BC: Heritage House. 2006
Glossary, Index, Epilogue, 256 pp. paperback
$19.95 Cdn

Reviewed by Dave Norton

When I tore into this Canadian book seeking new clues on the fate of this Hudson's Bay Company steamship, I found that the author had strewn my beeline to his conclusions with absorbing glimpses of 19th and 20th century history. Whoa! I thought: Let's savour this story. After racing to the book's concluding pages, I backtracked, and starting over, slowed down to do just that.

This chronicle of *Baychimo* is Metaphoric with the capital M that inspired America's spoof editors of *The Onion* to headline a mock April 1912 newspaper front page on the sinking of the *Titanic* with "WORLD'S LARGEST METAPHOR HITS ICE-BERG" (Dikkers *et al.*, 1999). Yet *Baychimo*'s story qualifies her as metaphoric for qualities precisely opposite those of the famous passenger liner.

Titanic struck an errant berg of freshwater ice in the North Atlantic on her meteoric maiden voyage; was hastily abandoned; plunged to the seafloor within hours; occasioned the loss of 1500 lives; and was resurrected in a sense and de-mystified through being located and explored on the seafloor by Robert Ballard and others near the end of the 20th century (Pellegrino 2000).

Baychimo, by contrast, plied ice-strewn northern seas from the Baltic to the Chukchi and Beaufort for 16 years, in workmanlike, even heroic service, before being methodically vacated by her crew for a winter camp in October 1931 (pp. 210-211); was blown, unmanned, offshore by a vicious gale, thereafter remaining afloat in or atop Arctic sea ice for at least four--possibly as many as 38—years; caused no loss of life; and has drifted off to an unknown—probably unknowable—ultimate end.

So, for superficial symbolism we can choose between two ships' rich stores of metaphors: for arrogance and hubris, we illustrate with the *Titanic;* for modesty and pluck, we choose *Baychimo*; for irrelevance, rearranging furniture on *Titanic*'s steeply sloping decks; for Arctic improbability, *Baychimo*'s reappearances—and so on.

This steamship's remains are now likely to be resting on the bottom somewhere between Pt Hope, Alaska, and the East Greenland Sea. The author reasons that the trajectory of ice floes in the Transpolar Drift that bore such famous vessels as the *Jeannette* and the *Fram* in the 19th century finally wrested this ship from yo-yo-ing and circling in two Western Arctic drift regimes (pp. 229-237) that trapped her for years.

Baychimo's keel was laid in Göteborg (Gothenberg) Sweden in 1913. The 70-metre long steamship with ice-strengthened hull and bow was launched two years later, christened *Ångermanälven*. This freighter plied Baltic ports winter and summer (p. 32) for her German owners until 1918, meeting the needs of Imperial Germany at war. The end of the Great War and the Treaty of Versailles brought about reparations, under which the sturdy vessel was confiscated by Britain (as were all ships of over 800 tonnes that had served Germany's war effort). Canada's Hudson's Bay Company coveted proven ice-capable merchant vessels, and purchased her in 1921 from the British government. Renamed for Fort Chimo, Quebec, following HBC's orthography for naming ships, *Baychimo* headed for her first true Arctic ventures. From Cardiff, Wales, Captain Falk took *Baychimo* high into the eastern Canadian Arctic in August and September 1921, where she performed splendidly in difficult ice conditions.

So splendidly, in fact, that the next year, governors of the Hudson's Bay Company decided to unleash *Baychimo* on trading for furs in the Russian—or was it already Soviet?—Far East. Her Captain and crew did not know ahead of time whether their bribes and assorted trumped up fees would fall into the hands of the White or the Red Armies in 1921. Civil war skirmishes and rear-guard actions were still taking place at many of their ports of call (p.52).

The challenging but lucrative Russian fur trade kept the *Baychimo* busy for several summers before her owners turned her full attention to the matter of servicing (including establishing, abandoning, and moving) Hudson's Bay Company outposts in Canada's Western Arctic. Even *Baychimo*'s first diversion from Russian voyages, in 1924, was unplanned, resulting from the need to recover the crew of HBC's *Lady Kindersley*, a wooden-hulled schooner beset and finally sunk by heavy ice northwest of Barrow (pp 80-81). By 1925, when *Baychimo* was assigned to plying the extended re-supply route from Vancouver around Alaska to Herschel Island, and eastward usually to Cambridge Bay, she had sailed between Britain and the Western Arctic via the Atlantic and Panama Canal (many times) and via the Suez Canal and a Pacific crossing (once). She was already a seasoned veteran of adventures, storms and scrapes with ice and running aground on poorly charted shallows that repeatedly validated the quality of her Swedish steel construction.

Metaphor, in fact, fits *Baychimo*'s story comfortably at a deeper level than comparisons merely with the *Titanic*. The smaller ship's existence transcended drastic historical changes, both as a working vessel (WW I; Russian Revolution and Civil War; collapse of Arctic commercial whaling and resurgence of Arctic fur trade; advent of aviation to the Arctic; beginning of the Great Depression) and as the furtive, unsinkable ghost ship (ascendancy of Soviet Arctic expertise; gathering clouds of WW II; probably WW II itself; and possibly the height of the Cold War). Along with the metaphoric historical backdrop to her biography as a living vessel, Anthony Dalton chronicles how *Baychimo* survived one frightful beating after another, as if earning credits toward graduation to a long, uneventful afterlife.

That afterlife consisted of years of ghostly reappearances to the few and scattered hunters and seafarers who venture offshore from Arctic Alaska and western Canada. How many years? Which of dozens of reported sightings of *Baychimo*'s distinctive profile between 1931 and 1969 are credible, and which are not? This is where the book's story is curiously unfinished. From the omission of a few published sources (e.g., Greist and Cook 2002) I detect that Dalton found it more difficult to research Alaska's published and unpublished sources of information than Canadian sources. Readers are left with the author's judgements on the credibility of latter day resightings through 1969. A couple of these last accounts are connected to people living in or passing through Barrow, Alaska, in the 1960s. Unlike most of the superbly documented sources of information for this book—heavily reliant on the Hudson's Bay Company Archives, for example (pp. 246-250)—the Barrow-connected accounts are not traceable by any thread that I can find. This unfinished business deserves a revised final chapter, in which the author or colleagues report on new scholarly--perhaps including oral history--investigations in Alaska. As it is, I commend this book as a very good read. With a stronger final chapter, its second edition should become a superb read. ❑

Vanishing World: The Endangered Arctic

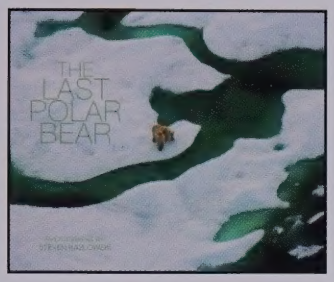
by Fredrik Granath (Author) and
Mireille de la Lez (Photographer)
Abrams Books (October 1, 2007), ISBN-10: 081099464X, Hardcover: 264 pages

Reviewed by Moki Kokoris

This hardcover coffee table book was published to coincide with the International Polar Year. It is an unprecedented and stunning visual record of life in the Arctic. Five years in the making, *Vanishing World* celebrates the wildlife that inhabits this harsh region with powerful images of a fragile world.

Set against striking landscapes of ice floes and ragged mountains, readers will see polar bears, foxes, seals, walruses, and reindeer who now struggle to live in this vulnerable climate. Images of a polar bear mother as she takes her newborns out for their first hunt, a seal pup only hours old, the spectacle of the polar night with its auroras, and the majesty of the glaciers and pack ice are all reminders of what is at risk.

Mireille de la Lez's masterful photography is accompanied by text that explains the precarious nature of life in this dramatic climate. After only the first few pages, it quickly becomes evident that this book is the result of enormous patience and understanding of the ice world. The photographs give new insight into the Arctic wilderness - a world far too precious to destroy. ❑ ***Reviewer's Warning:*** *Make sure you wear a bib when you leaf through this particular Vanishing World for you will not be unmoved. And if you purchase the book as a gift, buy two copies because you won't be able to give it away!*



The Last Polar Bear: Facing the Truth of a Warming World

by Steven Kazlowski

Reviewed by Herbert R. Drury

This fine "coffee table" tome is a lovely, yet heart-wrenching photo gallery and discourse, not only of the glorious, white polar bear, but also it's many companions in the arctic polar regions, human and otherwise. It is, of course, a bid for people everywhere to become more conscious of what we as a species are doing to the planet and how we can learn more about the effects of increasing greenhouse gasses on ourselves as well as the world's wildlife and ecology. For you who may have lost sight of the word "ecology's" meaning, it concerns the study of interrelations between all living things and their environment or "world." The book does a fine job of bringing this home to us by using the polar bear as just one organism among many that are being hurt and possibly exterminated within the next fifty years or less, by the things people—Americans mostly—are doing in their daily lives. The bear is little known by most of us, but was chosen because of its similarity to the proverbial "canary in the mine" since the population serves as a beacon to all of us for what is happening, not only in its habitat, but worldwide.

The author is a marine biologist turned photographer who for many years has lived with and documented this partially marine mammal. I say "partially" because it lives on both land and the sea ice, spends much of its time in the ocean and exists mostly upon what the sea provides. The rapidly changing climate, much faster in polar regions than elsewhere, according to the contributors in this volume, is seriously affecting not only the polar bears but many other Arctic species, both land- and water-based. Whales, seals, birds and even fish populations are changing, most of them negatively, as well as many native human residents of the polar regions of North America, eloquently depicted in photos and essays in this book. The Inupiat Eskimos of Alaska and other native tribes of Canada are finding it increasingly hard to survive in this, the most inhospitable environment inhabited by man outside of Antarctica. While humans may be able to adapt to these new conditions over time and through technology, the wild creatures of this huge and increasingly important region cannot. If people *en masse* do not join the movement to reduce our daily energy use, far higher in America than anywhere else, the carbon dioxide we continue to spew into our atmosphere will, sooner rather than later (by 2050?) end the existence of many species of fish, wildlife, birds and possibly even some human communities as we know them.

Several fine writers have contributed to this compendium: well-known authors, journalists, scientists and activists all concerned about reducing our carbon imprint on the planetary atmosphere that affects the entire world. We've all heard the "gloom-and-doom" cries of those who would have us believe the end is near; but these folks and their photos, emphasizing mostly the celebrity species of polar regions, show and tell us, in no uncertain terms, just what seems to be happening in our world and what we should all be doing about it, no matter who we are. Teddy Roosevelt (Theodore IV, great grandson of America's 26th president) speaks eloquently of the need to protect many wild spaces from further development. He notes that we still have not signed the Kyoto Protocol wherein most of the world's nations agreed to reduce carbon emissions, thereby failing to bring any leadership from the world's largest air polluter, (mostly from coal burning power plants and motor vehicles, as noted elsewhere in the book), possibly soon to be surpassed by China. And of course, we all know where our goods are being produced these days.

Another writer, Charles Wohlforth of Alaska, explains why and how the recent and speedy climate changes are affecting native villagers in his area. They depend upon whales even as polar bears depend on seals for their survival in that harsh, cold habitat where

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Quick Looks at Books

Reviewed by John Splettstoesser

Antarctica: Life on the Ice

Edited by Susan Fox Rogers
(Solas House, 2007, 299 pp, $17.95)

The editor/author of this book, which is part of the *Travellers' Tales* series, has assembled 20 stories/anecdotes by 20 authors who relate personal accounts of their impressions of "the Ice." They inject much human interest into each account.

Authors range from well-known scientists who have achieved considerable recognition in their fields (David Ainley, or "Mr. Penguin," in this case), to those who were employed in various capacities by the contractor funded by the National Science Foundation's Office of Polar Programs. Each author has a story to tell.

One of my favorite essays is by Guy Guthridge, NSF/OPP director of the program that made the above awards. Little was known about Guy's direction in his early life that led to one of the more prestigious positions at NSF, a program that boosted the humanities side of the American presence in Antarctica. That history is now revealed in Guy's chapter. Since retiring in 2005, Guy lives and spends much time aboard a boat.

One of the more provocative authors in the book is Nicholas Johnson, who wrote *Big Dead Place: Inside the Strange and Menacing World of Antarctica,* an exposé of the world of employment on the Ice (see *The Polar Times*, January 2006). Nicholas doesn't pull punches, as you see in whatever he writes.

Reviewing each chapter would be time-consuming, but each is worth reading, for the serious and also humorous side of life on the Ice. The editor is to be complimented on putting the series together.

A short Index of terms helps in a general way, as does a map of the continent with an inset map of Ross Island and its environs. The map should have received more scrutiny, however, inasmuch as misspellings occur (Cape Croizer [sic], Admundsen [sic]-Scott Base), Vostok is in two places—where it belongs on the map of the continent, but also on the north coast of Ross Island, where it does not. Antarctic Peninsula is in italic type (as water features and glaciers are), and the scale bars are labeled 1000 k. and 1000 m. (presumably km and mi). The N-E-S-W quadrant compass is irrelevant here with the continent centered at the South Pole. The imperfect map, however, does not detract from the value of the book, which makes excellent bedside reading. ❑

The Ferocious Summer: Palmer's Penguins and the Warming of Antarctica

by Meredith Hooper
(Profile Books, 2007, 299 p., £20

If you are collecting not only polar books but also those about global warming, this book fits both requirements. The title gives it away, with the location (Palmer Station, Antarctica) and also the harbinger of things to come, the effects of changes in climate on penguins, in this case mainly Adélies.

The content is basically a biography of Dr. William Fraser, a biologist who has conducted research in the Palmer area since he was a graduate student in the 1970s, then in association with Dr. David Parmelee of the University of Minnesota. Bill took on the task of studying the biology of the local seabirds by population censusing, instrumenting some of them for migration and foraging patterns, pumping the stomachs of penguins to analyze food resources and, in general, monitoring the life of the penguins, skuas, shags and gulls on the islands within Zodiac cruising distance of the station. Bill is presently with the Polar Oceans Group, Montana State University, Bozeman.

The author has done a remarkable job of providing details of the life and work of biologists, both Bill Fraser and his wife, Donna Patterson-Fraser, the arduous workday involved in visiting numerous study sites, recording data, weighing birds, banding them, all within the relatively short summer period when the birds come ashore to breed. The complications of weather conditions, which sometimes confine workers to the station to avoid the risks of traveling by small boat to islands under study, are covered in detail.

There is much discussion about the "warming" of the Antarctic Peninsula, its effect on sea ice production and distribution coupled with the food web that starts with phytoplankton that krill feed on, the latter fed on by penguins, and the need for sea ice to provide a habitat for the process to begin. When Bill started his research several decades ago, the area around Palmer was cold and dry. Now it is warm and wet, making a major difference in survival rates for penguins and associated elements of the ecosystem.

Penguin populations are down, chicks are not as robust as they used to be prior to fledging (independent from feeding by parents), and some of the colonies of birds have already disappeared, with others declining toward extinction (not of the species but of individual locations). The implications of global warming in the Peninsula seeming more rapid than in the rest of the planet are discussed, and whether the term of global warming or climatic change is used, the result seems to be the same.

The author traveled to Palmer with the support of the National Science Foundation Office of Polar Programs and its Artists & Writers Program. Prior to

CONTINUED ON P. 38

ice is thinning and receding faster than anyone can remember. He cites the attempts, now supported by many U.S. citizens, to get the polar bear federally listed as an "endangered species." This could allow additional litigation for more control of carbon-producing projects already in the works and which are sorely needed if we are to reduce these dangerous gasses in our atmosphere and their destructive effects.

Daniel Glick, a well-known journalist who has written for many different publications, gives us an interesting analogy of Planet Earth as a "sick" patient, using the anatomical and physiological animal systems for comparison with those of our mother world. He describes temperatures, respiration, circulation and other earth systems that are akin to our own and how scientists measure their status through chemistry, geology, meteorology and several other impressive ways about which most of us know little or nothing. In my opinion, this should be required reading for every thinking American. Glick concludes with a quotation from University of Colorado's James White: "You can't argue with the basic fact that we're changing the planet." The evidence contained herein seems virtually indisputable. And still more interrelationships are shown in the section, "Photographer's Journal: Polar Bear and Arctic Fox" plus their connectedness to migrating whales and native peoples as illustrated by conversations with Inupiat Eskimo elders who have witnessed climatic changes since childhood.

As Richard Nelson advises, the U.S. is the only Arctic nation that has no refuge specifically designated for polar bears. Our Arctic National Wildlife Refuge is the only public wild land where they are protected, but that is speedily changing. He gives us great details of the bear's birth, life, habits and relationships to land, people and climate conditions, thereby cementing the need for more complete protection from oil exploration and development, most of which is being ignored.

As Nick Janes tells us in "Living With Oil: The Real Price," big oil development is rapidly moving in on the most critical areas of polar bear habitat. Many local people support the industry because it gives them a degree of comfort and financial security they have not had since before the early whaling days. Even some Indian tribes to the south, whose livings depend more on caribou than whales, polar bears or foxes, go along with much of the new industry, but are often frustrated by losing hunting or fishing areas without getting much in return. The land may stay relatively unchanged, but its use and biological productivity are suffering. All the new industry in Alaska and other arctic regions may not be affecting polar bears *per se*, but its effects on the region's wildlife and peoples is being felt more strongly every day. How long can we allow this to go on? Even other areas of the Arctic are losing sea bird populations to changing ice and sea conditions where less nutritious Pollock are now largely replacing codfish in the bird's diets, much of which can apparently be attributed to new patterns of global warming affecting sea currents, ice melt and climates world wide.

There is hope, according to Francis Beinecke, president of the Natural Resources Council. Bears may be the first to lose 100 percent of their habitat to global warming, but people—especially in California—are stepping up to the plate and addressing this issue. New laws are being passed and more often supported, there and elsewhere in our nation, to control carbon-producing enterprises like coal-burning power plants and gas-guzzling vehicles. There is now growing awareness and concern about saving energy to reduce carbon output in ways never before considered by the masses. These new programs are finally starting to help make America more "carbon-neutral" by instituting limits and controls on what industry can emit, most of which comes from various forms of energy expenditure. We are at last beginning to "think green" about what we buy, use or discard, and how we can save energy.

At the end, Daniel Glick gives us numerous tips, many of which we may already know or use, on how we, as the greatest polluters on earth, can start reducing—even if only in miniscule amounts that add up worldwide—our own personal carbon footprint to help save our planet. Yes, indeed, something to think about, thanks to the relatively scarce and mysterious but magnificent polar bear that most of us have never, and will never, see in the wild.

This remarkable publication is a product of Braided River Books, a division of the well known Mountaineers Books, and will appear in February 2008 along with museum exhibits in Seattle, Wash., that will travel throughout the U.S. along with special book tours by many of the authors. ❑

Obituaries

Bolling Clarke

***Philadelphia Inquirer*, 12 November 2007, by Sally A. Downey**—Bolling Byrd Clarke, 85, of Kennett Square, retired medical counselor and daughter of explorer Adm. Richard E. Byrd, died of heart failure 3 Nov. at the Hospital of the University of Pennsylvania.

"I was jealous of Antarctica," she told a reporter in 1991, "because it took him away for three years at a time." When she was 10, she said, she asked her father if she could go on his next expedition. He told her she was too young and that women did not go on Antarctic expeditions.

In 1989, she took a three-week cruise to the continent her father described as "incredible, unbelievable and fantastic." After her return she gave lectures about the continent to community groups. "I always thought of Antarctica as being black and white," she told an audience in 1991. Instead, she found that "there were also beautiful blues and greens shining through." She remembered standing on an island, watching and being watched by 40,000 penguins, and sailing close to a nine-mile-long iceberg.

She is survived by daughters Eleanor, Evelyn and Marie; son Richard; and eight grandchildren.

Dwight Lyman Schmidt

by Arthur B. Ford—After a long career with USGS, Dwight Schmidt died on 24 March 2007 following a lengthy bout with cancer. He was 80.

Born in Fond du Lac, Wis., Dwight joined the Navy during World War II, afterwards entering the University of Wisconsin to study physics. In 1949, he enrolled in the geology department, University of Washington/Seattle, where he earned M.S. and Ph.D. degrees. Upon graduation, he worked in Idaho, Antarctica, Saudi Arabia and the American southwest. In Antarctica, he studied the geology of the Patuxent Range, Neptune Range, and Forrestal Range, all in the Pensacola Mountains, and the Lassiter Coast of the southern Antarctic Peninsula. The name Schmidt Hills of the Neptune Range honors Dwight's pioneering contributions to the structure and stratigraphy of that and other Antarctic areas.

Dwight was widely admired for his work ethic, breadth of knowledge, clear geologic insights, professional contributions, and above all for his empathy and generosity toward all. The eminent J. Hoover Mackin called him as "one of Nature's noblemen."

He is survived by his wife of nearly fifty years, Carol; sons Keegan and Lyman; and three grandchildren. ❑

that, she visited Antarctica under a similar program of the Australian Antarctic Division. The book is recommended for those following the biologic aspects of Antarctic science, and the changing climatic conditions that affect the ecosystem.

Arctic Alpine Ecosystems and People in a Changing Environment

Edited by Jon Børre Ørbæk, Roland Kallenborn, Ingunn Tombre, Else Nøst Hegseth, Stig Falk-Petersen and Håkon Hoel
(Springer, 2007, 433 pp, $199)

This book of 21 chapters by 46 authors consists of papers presented at the international conference on the topic of the title, organized in Tromsø, Norway in 2003. As the title of the book and of the chapters indicates, the conference was interdisciplinary in scope, intending to include the international marine, terrestrial and atmospheric environmental-change research communities to meet and exchange recent research and its results. The emphasis was on the European Arctic and alpine environments. The major themes of the chapters are grouped into three fields: Climate change and ecosystem response; Ultraviolet radiation and biological effects; and Long-range transport of pollutants and ecological impacts. The effects on people and animals are interwoven in many of the chapters.

The roles played by atmospheric and oceanic systems are well documented and discussed in several chapters, in one case that of contaminant transport of radioactive sources dumped in the Kara Sea, consisting of 17 nuclear ship reactors, seven of them still containing spent fuel. The sunken submarine *Komsomolets* contains one nuclear reactor and two nuclear torpedoes.

There is no mention in the book of the contaminants created by the Chernobyl nuclear reactor incident of 1986, in which widespread areas of Europe were affected by downwind transport of radioactive materials, which appeared on the Greenland ice sheet shortly after.

A colored map on p. 149 showing the current systems in the European Arctic is especially useful in illustrating the means of transport of warmer and cooler waters, as well as the pathways that pollutants might take.

Ecosystem effects of Arctic warming are discussed in chapter 9, a useful harbinger of things to come as the planet warms in this century, affecting growing seasons, for example.

Overall, the book is especially useful for scholars of the interaction between ecosystems in the northern part of the world, in this case mainly European, and the humans affected by climatic changes over which they have no control, but to which they must adapt. ❑

Membership News

Greetings from the Coast of Maine!

The leaves have turned to brilliant colors and are coming down. The days are bright and sunny but darkness falls much faster, and it is getting pretty chilly in the mornings. Must be fall in New England, with winter just around the corner. In October, the Membership Center sent out over 400 reminders to memberships due to expire by the end of the year. Believe it or not, this is actually a decrease from earlier years and mostly likely due to the legions of you who "re-up" with the APS via the four-year extended membership rate. Please consider doing this again when it is time for your renewal. Thank you also to all who responded promptly with your membership renewals. It makes my life as Membership Chair much easier and saves the society the extra postage costs needed to track down errant members. Thank you also to everyone who sent in updated addresses and contact information.

This is going to be even more important in the coming year because, starting in October 2008, the APS Membership Center will attempt to send most of its renewal notifications by email. To that end, please be sure you have sent in your most up-to-date email address.

Rest assured that members who do not have email, do not wish to share their email address with us, or do not respond to email attempts will still be contacted by good old reliable, regular mail. We are simply attempting to make a dent in the rising postage costs that the society faces, and this renewal-by-email campaign is just one part of our ongoing efforts to keep society costs low. Your help and attention in this matter is greatly appreciated.

Recruitment efforts have been effective this year, and our membership is holding steady. Thank you to all who have signed up or introduced someone to the society. Many of you are also very good about letting us know of address changes. As a result, we have seen a drastic decrease in the amount of returned Polar Times to the Membership Center, which is very good, since it costs the society almost $5 for each returned magazine.

With the end of the year also comes the Membership Center's annual report. This year, the document will be available to the general membership. Just contact me at the Membership Center and I will email or regular-mail you a copy. The report will be ready and available the final week of December. It breaks down membership data by state, category and so forth as well as provides data regarding numbers of new members, new life members and changes in our membership throughout the year.

Thank you again, and it is my pleasure to be your American Polar Society membership chair! ❑

Charles H. Lagerbom
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About Our Back Cover

Despite serious concerns addressed in this issue, all is not on the downside in the far north, as Dave and Carol Norton's photo of lichen in Denali National Park vividly portrays. The genus is Cladina, *and the species is probably* stellaris. *It is one of the group known commonly as "reindeer lichens" and was photographed on an 8-km hike between Wonder Lake and McKinley River in July 2007.*

Major Contributors This Issue

Billy-Ace Baker • Abel Shafer
Peter Anderson •

Membership Rates

Regular Membership Rate
U.S. . . . $15/yr
Foreign . . . $17/yr
Library/Institution . . . $20/yr

Extended 4 Year Membership Rates
U.S. . . . $50
Foreign . . . $56

Life Membership Rates
U.S. . . . $250
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Institutional Gift Rates (3 years)
U.S. . . . $50
Foreign . . . $59

Development Committee Announcement

The Development Committee of the American Polar Society seeks volunteers to help create educational programs and raise money for them. Interested members should contact Sheldon Bart, committee chair, at **WildResch@aol.com** ❑

Purpose of APS

"The purpose of the American Polar Society is to bring together people interested in research and exploration in the Arctic and Antarctic; to preserve the record of polar research and exploration; and to support and encourage research and exploration in polar and polar-like regions. Toward these ends, the Society will collect and disseminate information about polar regions; compile written records, oral histories, maps, photographs, film and video, and electronic information relating to polar regions; aid organizers and members of polar expeditions; and maintain contact with scientists, explorers, research institutions and interested parties." ❑

Great Looking APS Patch!
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